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New Irrigation Projects for Egypt and the Soudan.—II.

LAST week we dealt with the various questions propounded by Sir William Garstin relative to the control of the Upper Nile. It is scarcely necessary to point out that as the Soudan and Egypt proper must derive their supplies of water from the same sources, and as the prosperity of both countries depends entirely upon the one river, any important irrigation scheme projected for one country has a definite bearing upon the other. The ostensible object of the Report by the chief of the Public Works Department is to consider the improvement of the Upper Nile, but, as a matter of fact, the Blue-book goes beyond the subjects indicated in the title. For the sake of consistency, however, the discussion of works chiefly connected with Egypt is continued in appendices to the volume.

We now turn to the consideration of the main irrigation projects for Egypt, which, in the opinion of Sir William Garstin, are "advisable for execution within a not very remote future." The mild verbiage of the extract in the foregoing sentence is evidently intentional, for Sir William repeats in the present Report, what he has said on previous occasions, that the execution of large engineering works in Egypt is not extremely urgent, with the solitary exception of an adequate escape for the Nile during unusually high floods. The various schemes proposed are recognised to be desirable, and properly so, for their realisation would largely increase the wealth of Egypt. We go a little beyond the studied moderation of official language, and suggest that some at least of the projects actually are urgent, although not vital to the financial stability of the country. In support of this contention we cite the fact that, although the Assouan Dam was only completed at the end of 1902, the whole of the water furnished thereby has already been apportioned, and the Irrigation Service has been compelled to refuse applications for water. The world, and Lancashire in particular, wants cotton of that variety which no country can produce better than Egypt, and yet, to quote the words of Sir William Willcocks,* "the Egyptian landowners of 1½ million of acres are compelled to wait perhaps for many years, while every country under the sun which can grow cotton is trying to acclimatise their special product, and they themselves are doomed to sit idle."

Those who read between the lines will see by the following extract that Sir William Garstin is fully aware of the advantages to be gained from the execution of further large engineering works for increasing the supplies of water to cultivators. He says:—"The desire to acquire fresh land in Egypt is general, and is becoming keener. An increase to the cultivated area must also increase the revenues. If the Egyptian Government is prepared to face a large expenditure, then I see no reason for delaying the execution of the more important projects, and I have no doubt whatever that the results obtained will fully warrant such a decision if taken."

Before discussing any such schemes we will refer briefly to the question of flood escape. So many years have passed without the occurrence of a dangerous flood that the danger to Northern Egypt at such a time may appear to be a remote contingency. Sooner or later, however, another high flood will come, for past records show that the intervals between abnormally high floods never include many years. Owing to the extension of cultivation, the improved methods adopted, the increase of population, and the augmented value of land, the damage consequent upon a breach in the banks of the Nile would be far more serious in the present day than was the case in former times. Therefore it is imperative that a considerable sum should be expended in the provision of means for carrying off the surplus waters of dangerously high floods. If this precaution be neglected there will inevitably come a disaster that will carry ruin and desolation throughout the land. Two methods are now proposed for the provision of escape power: (1) The construction of an escape canal leading to the Wadi Rayan depression in the Fayoum, and (2) the remodelling of the Rosetta branch of the Nile. Both these projects receive attention in Appendix I. of the Report.

* "The Assuan Reservoir and Lake Mœris," 1904.

Sir William Garstin there states that "no examination of the different measures possible for improving the water supply of Egypt can be complete without taking into consideration those schemes proposed for this purpose by Sir William Willcocks.* These are of such importance that I will give them precedence over all others."

The schemes in question are the following:—

(1) The raising of the Assouan Dam to provide water for perennial irrigation in Upper Egypt.

(2) The utilisation of the Wady Rayan as a secondary reservoir for Northern Egypt, and to serve as a flood escape.

(3) The remodelling of the Rosetta branch, to enable it to be used as a flood escape.

Sir William Willcocks originally designed the Assouan Dam of such a section that it could afterwards be raised 6 metres, and so hold up an additional volume of 1,000,000,000 cubic metres of water, and he has repeatedly urged the desirability of raising this structure to its full height. In the present Report Sir William Garstin candidly admits that he has hitherto opposed the immediate execution of this work, and adds that, if it be considered as forming a portion of a definite programme, he withdraws his opposition. He says further, "I consider it to be a desirable project, and one that will render undoubted service to Egypt." We need not discuss the reasons assigned for the original opposition offered by Sir William Garstin. So far as we are aware, no one has ever suggested the work for execution without the formulation of a definite programme for utilisation of the additional summer supply. Only two of the five objections appear to be of weight—one relating to the provision of funds, and the other to the further submersion of the monuments on Philæ Island. With regard to these, we may say that, owing to the happy relations now subsisting between England and France, financial difficulties in Egypt are far less acute, and that, while the further submersion of Philæ will probably cause no injury to the temples, it will most certainly detract still more from the picturesqueness of the buildings and of the landscape generally. This, as Sir William Garstin says, "must always be a matter for deep regret, but even such a consideration should not be allowed to weigh against the benefits that would result to the fellahin of Egypt from so large an increase in the storage capacity of the Assouan reservoir."

Our only objection to the project is based on the æsthetic point here raised, otherwise we thoroughly endorse the opinions, to which Sir William Garstin now expresses his adherence, that the project is one from which almost immediate results may be anticipated, and that the extra water stored can be utilised in Lower Egypt almost at once, without waiting for the substitution of perennial irrigation in Upper Egypt for the existing basin system. It is a happy augury that the two leading irrigation experts in Egypt are now in accord as to the desirability of a scheme which will double the capacity of the Assouan reservoir at an estimated cost of not more than 500,000*l.*

* "The Assuan Reservoir and Lake Mœris."

It should be noted that the present proposal to utilise the Wady Rayan is very different from that suggested by Mr. Cope Whitehouse in 1894. The idea then was to fill the reservoir direct from the Nile when the levels permitted, and to use the water to supplement the discharge of the river at the time of its lowest volume. This scheme possessed such inherent defects that, after careful consideration, it was rejected by Sir William Willcocks when acting as Director-General of Reservoirs. To-day the position is entirely changed, owing to the completion of the works at Assouan and Assiout, and Sir William Willcocks now stands as a strong advocate of the Wady Rayan scheme. The accompanying plan

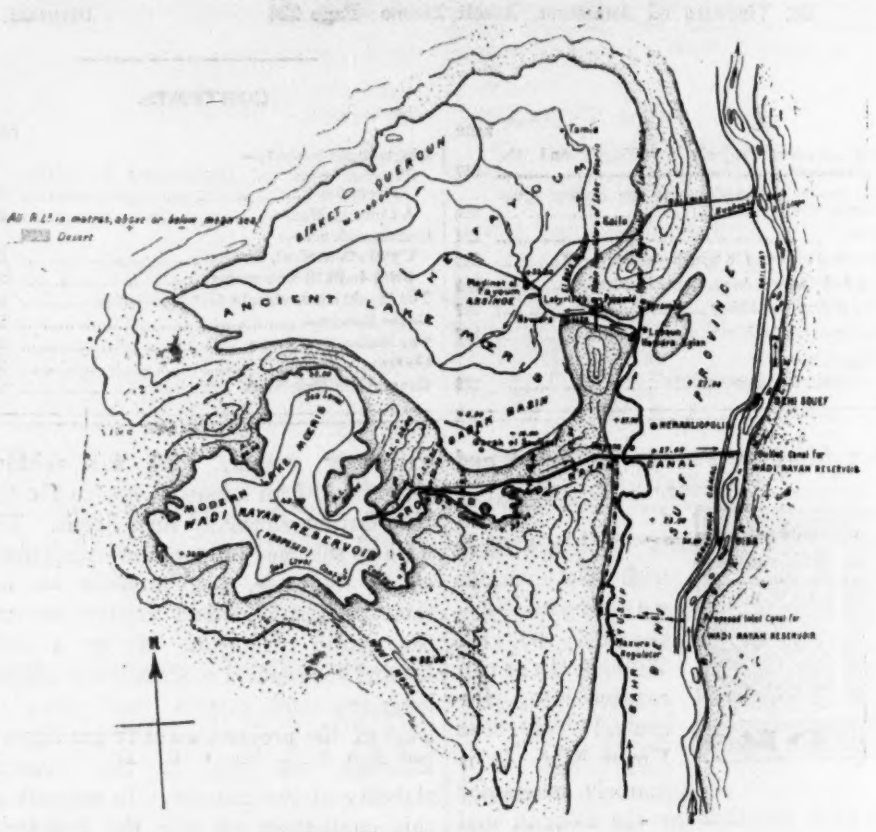

Fig. 1.

shows the general design of the proposed works. Formed about 2,000 years ago, the ancient Lake Mœris covered the whole of the Fayoum up to the level of 22.5 metres above mean sea level. Sir Hanbury Brown, in his work on the "Fayoum and Lake Mœris," has collected all available information concerning the ancient lake, and after thorough examination of the question has expressed himself in favour of converting the Wady Rayan into a modern Lake Mœris. Sir William Garstin also says in the present Report that the scheme is a most attractive one, and, "if feasible, appears to solve the problem of the best method of increasing the water supply of Egypt." The project is thus described by its originator*:—"When the Assouan Dam will have been raised, we shall be standing on the threshold of what it will be able to do. The projected Wady Rayan reservoir, or the modern Lake Mœris, will be well able to supply the two remaining milliards of cubic metres of water when working in conjunction with the Assouan reservoir. The great weakness of this projected lake has lain in the fact that *by itself* it can give a plentiful discharge in April and May, less in June, and very little in July, and it was for this reason that in my report of 1894 to the Egyptian Government I had reluctantly to recommend that it be not carried out. But when the Assouan reservoir is capable of supplying two milliards of cubic metres of water it will be possible to utilise the Mœris Lake to its utmost capacity. The Assouan reservoir, being high above the level of the Nile, can give its supply at the beginning or end of the summer; it can give it slowly or with a rush; while the projected Lake Mœris being directly in communication with the Nile, and only slightly above low Nile level, its discharge would depend entirely on the difference of level between it and the Nile, and consequently as the summer advanced it would gradually fall, and not be able to give at the end of the summer a quarter of the discharge it could give at the beginning.

"But let us imagine that the reservoir and the lake are both completed and full of water, and that it is the first of April. Lake Mœris will be opened on to the Nile and give all the water needed in that month, while the Assouan reservoir will be maintained at its full level. In May Lake Mœris will give nearly the whole supply and the reservoir will give little. In June the lake will give little and the reservoir much; while in July the lake will give practically nothing and the reservoir the whole supply. Working together in this harmonious manner, the reservoir and the lake, which are the true complements of each other, will easily provide the whole of the water needed for Egypt."

Naturally, as in all important undertakings of the kind, there are several points worthy of investigation, and these have been duly considered by the chief officials connected with the Irrigation

* "The Assuan Reservoir and Lake Mœris," p. 11.

Department. In the first place, it is necessary to take into account the volume of water which it is now proposed to reserve for irrigation purposes in the Soudan. The amount so apportioned is equal to 200 cubic metres per second, and its abstraction from the river during the winter months will not be without its influence on the scheme. As a matter of fact, two alternative projects are proposed by Sir William Willcocks: (1) A reservoir to hold two milliards of cubic metres with a single channel for filling and discharging; (2) A reservoir to hold three milliards of cubic metres with separate inlet and outlet channels.

In a supplement to Appendix I. of the Report, Mr. Webb, Inspector-General of Irrigation in Upper Egypt—making use of figures furnished by Mr. Verschoyle, Inspector-General for Lower Egypt, as to river discharges—shows that after deduction for the Soudan the smaller reservoir proposed could not be filled by means of the Bahr Yusuf during the winter months in a year of minimum supply, and that even after a mean year the filling of the reservoir would be difficult and might prejudicially affect navigation in the river. Further, he points out that in order to supply the Yusufi Canal it would be necessary to maintain a head of 4.5 metres above the Assiout barrage, a course that would in his opinion entail the construction of a subsidiary downstream weir similar to those recently built by Sir Hanbury Brown below the Delta barrage, together with remodelling works in the Bahr Yusuf and the upper reach of the Ibrahimieh Canal. Therefore, in order to render the smaller project feasible, it appears necessary either to increase the supply passing Assouan during the winter or to abandon the idea of providing the supplies proposed for the Blue Nile region. With regard to the second or larger project, Mr. Webb considers that the scheme is quite feasible, as the reservoir could be filled every year by the flood water, and even in very low floods like those in 1899 and 1902. Mr. Webb also criticises the dimensions of the feeder and outlet canals proposed by the originator of the scheme. However, so far as the principle of either project is concerned, there seems to be no essential difference of opinion between Sir William Willcocks on the one hand and Mr. Webb on the other. The recent proposal to withdraw water for the Soudan is a matter that might be dealt with by increasing the flow of the Nile by measures such as those discussed in our article of last week, and the dimensions of the feeder and outlet canals for the new reservoir are simply details, although they may affect the cost of the work very considerably.

There remains, however, one point for consideration which is of much importance, namely, the uncertainty as to whether, when the reservoir is full, the high water level maintained will not gradually cause infiltration through the ridge separating the Wady Rayan from the Fayoum. About this there are differences of opinion. Sir William Willcocks states definitely that there will be no infiltration, pointing out that the present Fayoum was formerly full of water standing 63 metres higher than the bottom of the Wady Rayan, and remained so for thousands of years. He argues that if there had been any serious infiltration from the ancient Lake Mœris there would have resulted a considerable lake in the Wady Rayan which could not have escaped the notice of the numerous travellers who have visited the district in various ages. Other authorities, including Sir Benjamin Baker and his colleagues on the Technical Commission, have expressed the fear that infiltration might result, and, taking everything into consideration, Sir William Garstin comes to the conclusion that a thorough geological examination of the country is desirable before definitely recommending the execution of the project.

Before leaving the question of the Wady Rayan it should be mentioned that in many respects this depression would constitute an admirable site for a flood escape, but we are inclined to agree with Mr. Webb, who points out that, "if the Wady Rayan is to be considered as a flood escape, it would be advisable to still further widen the inlet canal." The late Colonel Ross calculated the minimum discharge of a Nile flood escape at 100,000,000 cubic metres a day. Such a discharge would necessitate a canal of very large section and very heavy expenditure which, the Report says, would only be warranted were no alternative means available. This consideration leads to the third proposal, namely, the remodelling of the Rosetta branch of the Nile.

In his recent pamphlet Sir William Willcocks recommends that both branches of the river should be so improved as to diminish the danger from flood. The insecurity of the country against a very high flood is only known to those responsible for guarding its banks, and we have already stated that immunity from dangerous floods cannot be expected to continue. During high floods, the Nile is considerably above the level of the land, which is protected by embankments stretching from Assouan to the sea. In Upper Egypt a very high flood is fully 1 metre above the land, on the Rosetta branch of the Nile it is 2 metres, and on the Damietta branch as much as 3.5 metres in some places. The Damietta branch is practically little more than a canal, and Sir William Willcocks considers the wisest policy would be for the Government to take the Rosetta branch and call it the Nile, regulating upon the Damietta barrage as though the Damietta branch were an ordinary canal. He proposes that the section of the Rosetta branch shall be brought to a uniform width by means of spurs, and the banks thrown back where necessary, so that this channel may be able to carry a much larger discharge without danger to the country. It should be added that the desirability of avoiding an excessive discharge in the Damietta branch has long been recognised by the responsible chiefs of the Irrigation Department, and the only thing necessary with regard to this waterway would be to regulate it by means of the Barrage, so that the discharge should not exceed that of a normal flood. In the opinion of Sir William Garstin, it would certainly stand this without any serious risk to the country, more especially if a sufficient sum were spent in strengthening the banks and in training works. He says with regard to the Rosetta branch, "If it is to act as a flood escape, and I agree with Sir William Willcocks that it should be made to do so, then, as he says, it must be put in thorough order and remodelled throughout its length."

Apart from auxiliary works for the efficient distribution of water, and, above all, of drainage works which are absolutely indispensable corollaries to irrigation canals, the conversion of lands from basin to perennial irrigation, the reclamation of areas still unfit for cultivation, and the regular operations of the Irrigation Service, we have now touched upon all the important irrigation works projected or foreshadowed in connexion with Egypt and the Soudan.

Let us next summarise the various undertakings mentioned in the Report, some recommended for immediate prosecution, others for execution after a few years, and others as proper objects for inquiry. In the table following we include the estimated cost of each project, these figures being subject to the reservation that they are, as Sir William Garstin says, "nothing but approximations, based for the most part upon rough calculations, and that consequently they do not possess much value." Definite estimates will of course be prepared later, from which accurate ideas of the cost and value of the various schemes can be obtained. In the meantime we may fairly assume the amounts set forth to be quite near enough for general guidance.

TABLE SHOWING NEW IRRIGATION PROJECTS FOR EGYPT AND THE SOUDAN.

No.	Description.	Chief Object.	Estimated Cost.
			£E.
1	Remodelling Rosetta and Damietta Branches of the Nile	To provide flood escape	900,000
2	Raising of the Assouan Dam	To increase storage capacity by 1,000,000,000 cubic metres	500,000
3	Bahr-el-Gebel:—		
	(*a*) Construction of New Channel	To increase water supply for Egypt and the Soudan	5,500,000
	(*b*) Remodelling of Bahr-el-Zaraf		3,400,000*
4	Wady Rayan Reservoir	To storage of water for Lower Egypt and to serve as a flood escape	5,700,000†
5	Conversion of 750,000 acres in Upper Egypt to Perennial Irrigation	To utilise additional storage in Assouan reservoir	3,000,000‡
6	Two Barrages in Upper Egypt	To facilitate distribution of additional water stored in Assouan reservoir	2,000,000
7	Canal and Drainage Works in Lower Egypt	To utilise additional supplies contemplated	1,000,000
8	Regulation of Lakes Victoria and Albert	To provide further water for Egypt and the Soudan	2,000,000
9	Barrage on Blue Nile	To develop the Eastern Soudan	1,000,000
10	Ghezireh Canal System on Blue Nile	,, ,,	2,000,000
11	Reservoir near Rosaires on Blue Nile	,, ,,	2,000,000
12	River Gash Scheme	,, ,,	500,000
13	Reservoir Project on Atbara River	,, ,,	—
14	Reservoir Projects on Rivers Dinder and Rahad	,, ,,	—
15	Reservoir Projects on Upper Valley of Atbara River	,, ,,	—

* This is merely an alternative. † The cost, as estimated by Sir William Willcocks, is only 2,600,000*l.* E.
‡ This item is stated at 5,000,000*l.* E. elsewhere in the Report, apparently in error.

Beyond the undertakings mentioned in the foregoing table, it must be borne in mind that, as previously stated, at least 1,000,000*l.* has still to be spent upon conversion works in Middle Egypt, so as to permit the complete utilisation of the water held up by the Assouan Dam at its present height. As this expenditure forms part of the previous irrigation programme connected with the Nile Reservoir Works, the item is not included in the table, although the funds have still to be provided by the Egyptian Government.

Considering the relative urgency of the works mentioned in the table, we must first emphasise the fact that, while the needs of Egypt proper are of paramount importance, the Soudan ought not to be neglected. This point to some extent affects the order in which the works are recommended for execution. Again, some of the projects are at present in a very nebulous condition, and cannot be regarded as being more than mere suggestions for inquiry. Lastly, we must remember that, even if the whole of the plans were prepared, and the funds were available, the works could not be completed for many years to come, partly because it would be necessary to preserve a certain natural sequence, and partly because extensive auxiliary works in the form of weirs, regulators, irrigation canals, and drainage channels would have to be executed after the completion of each item in the large programme now before us. Subject to such reservations as these, we may point out what portions require relatively early treatment and what portions may advantageously be left for future consideration.

Having regard to the urgent necessity for protecting the highly-cultivated lands of Egypt from disaster in the event of dangerously high flood, we are thoroughly justified in placing the remodelling of the Rosetta and Damietta branches in the first place, and the raising of the Assouan Dam second, although, as suggested by Lord Cromer, the two works might be dealt with simultaneously. If no special provision were contemplated for the Soudan, we should be inclined to support Sir William Willcocks in advocating the formation of a reservoir and flood escape in the Wady Rayan, and in assigning the third place to this project. The determination of the Public Works Department to take early steps for the development of the Soudan naturally indicates the improvement of the Bahr-el-Gebel as the project next in order to the two already mentioned. Having increased the discharge of the Nile by obviating waste in the Sudd regions, it might certainly be advisable to construct the proposed reservoir in the Wady Rayan, and then, adding the storage capacity of the reservoir to that of the Assouan reservoir, enough water would be stored within the boundaries of Egypt to suffice for the irrigation of every acre of cultivable and reclaimable land. Sir William Garstin at present appears to assume that the improvement of the Bahr-el-Gebel may furnish enough water to render unnecessary the construction of the Wady Rayan reservoir, but possibly he is also taking into account the extra discharge to be obtained by regulation of the Great Lakes. At any rate he does not include the item among his present recommendations. No one can predict how long it will be before the two projects on the Upper Nile can be realised, and one most favourable feature about the Wady Rayan scheme is that the site is right in the midst of civilisation and readily accessible for the introduction of labour and materials. Assuming no geological difficulties are shown to exist, the construction and filling of the reservoir could be completed within a period estimated by Sir William Willcocks at four years, and by Mr. Webb at seven years. The water stored would then be available for Egypt while more ambitious undertakings were in progress, and when additional supplies from the upper waters of the White Nile become so ample that the Wady Rayan will no longer be required as a reservoir it will constitute an efficient flood escape, as Lake Mœris did in ancient times. The point here discussed is of much importance and clearly deserves consideration.

Turning attention to the Soudan, we cannot do better than quote the words of Sir William Garstin, who says, "The money that may be spent in that region upon development is practically unlimited." At the present time water and irrigation works are wanted to a limited extent for the encouragement of agriculture by the existing population. But it is undoubtedly the fact that the Soudan is not yet ready for the introduction of irrigation works upon a large scale. For many years to come the chief want of the country must be population. As, however, no progress will be possible until a commencement has been made, all the projects mentioned are to be studied without delay, and those which promise even a moderate amount of success will be put in hand as soon as the necessary funds become available.

Sir William Garstin has prepared three estimates which we have summarised in the following table :—

NEW IRRIGATION PROJECTS RECOMMENDED.

No.	Description.	Estimate I.	Estimate II.	Estimate III.
		£E.	£E.	£E.
1	Rosetta and Damietta Branches	900,000	900,000	900,000
2	Assouan Dam	500,000	500,000	500,000
3	Bahr-el-Gebel	5,500,000	3,400,000	5,500,000
4	Conversion of Upper Egypt Basins	3,000,000*	3,000,000*	2,500,000
5	Barrages in Upper Egypt	2,000,000	2,000,000	1,000,000‡
6	Canal and Drainage Works, Lower Egypt	1,000,000†	1,000,000†	500,000
7	Regulation of Great Lakes	2,000,000	2,000,000	—
8	Barrage on Blue Nile	1,000,000	1,000,000	1,000,000
9	Ghezireh Canal System	2,000,000	2,000,000	500,000
10	Reservoir at Rosaires on Blue Nile	2,000,000	2,000,000	—
11	River Gash Scheme	500,000	500,000	500,000
	Total	20,400,000	18,300,000	12,900,000

* Stated at 3,000,000*l.* on p. 175 and 5,000,000*l.* on p. 176, the latter apparently in error. † Omitted in Estimates I. and II., as given in the Report. ‡ One barrage only.

For some reason, not explained in the Report, the item for the execution of canal and drainage works in Lower Egypt is omitted from Estimates I. and II. in the original. We have therefore added the cost of these works in each case, so that the three schemes may be comparable, and, as in the previous table, we have put the cost of conversion works in Upper Egypt at the figure first stated in the Report. Estimates I. and II. include the projects which Sir William Garstin selects as those most suitable for execution, leaving the others mentioned in his Report for subsequent consideration. It will be observed that No. II. is the same as No. I., with the exception of the item relative to the Bahr-el-Gebel, the cost of the new channel being included in the former and that of improving the Bahr-el-Zaraf in the latter. Estimate No. III. deals simply with works considered to be urgent, but a footnote in the Report says, "The only really urgent works to my mind are Nos. 1, 2, and 3. These involve an expenditure of 6,900,000*l.*E."

We have now to see what return may be anticipated from the expenditure involved. Sir William Garstin says that this is not easy of calculation, especially so far as the Soudan is concerned, for it is impossible to predict how soon the revenue will reach the maximum, corresponding with the ultimate expenditure. Taking Estimate No. I. as the basis of calculation, the results are as given below :—

APPROXIMATE ANNUAL RETURNS IN LAND TAX FROM EXPENDITURE IN ESTIMATE NO. I.

	£E.	£E.
UPPER EGYPT:—		
Basin Land Converted	375,000	
Land Irrigated by Pumps	30,000	
LOWER EGYPT:—		
Land Brought under Cultivation	800,000	
		1,205,000
THE SOUDAN:—		
Ghezireh Lands	350,000	
Lands on the Gash	50,000	
Land in the Nile Valley North of Khartoum	100,000	
		500,000
Grand Total		£E1,705,000

Assuming the correctness of these figures, the return upon capital would be about 8·35 per cent., without taking into account the increased value of the lands brought into cultivation or the increase in the railway and custom receipts. The increase in the value of land would be very considerable. In Egypt alone, two million acres remain for improvement, two-thirds of this area having only flood irrigation, and one-third being entirely without irrigation. Sir William Willcocks, who, in addition to his long official experience, has acquired useful commercial experience as the managing director of a land and irrigation company, estimates that the value of these lands would be increased by 30*l.* per acre if perenially irrigated. This means an addition of 60,000,000*l.* to the national wealth. Taking Estimate No. I., and debiting the Soudan with 2,000,000*l.* only of the cost of works on the Bahr-el-Gebel and at the Great Lakes, we have, in round figures, 13,000,000*l.* for Egypt and 7,500,000*l.* for the Soudan. Then, over and above returns in the form of land tax and other receipts, Egypt would obtain 60,000,000*l.* for an expenditure of 15,000,000*l.*, and there is no reason why a similarly

satisfactory result should not be attained in the Soudan by careful and judicious outlay.

The possibilities opened up by the projects discussed are vast almost beyond conception. No doubt the details of the various schemes may have to be modified as further information is rendered available, but the general programme surely indicates the lines of development to be followed. Sir William has clearly earned the gratitude of Egypt by the care and conspicuous ability with which he has treated the subject, and, if successfully accomplished, the works foreshadowed in his Report will increase the wealth of the country beyond the dreams of the most sanguine, and at the same time will constitute a splendid monument to the engineering genius of the present era.

THE PRESIDENTIAL ADDRESS AT THE BRITISH ASSOCIATION MEETING.

MODESTLY describing himself as an amateur, Mr. Balfour delivered on Wednesday last week one of the most admirable presidential addresses which has been contributed to the proceedings of the British Association within recent years. The subject chosen, "Reflections Suggested by the New Theory of Matter," necessarily involves the consideration of difficult and abstruse problems, and the task of preparing an address upon such a subject, for delivery before a critical audience, would be thought sufficiently formidable, even by a professional scientist. In his address, Mr. Balfour deals almost entirely with speculative physics. He shows that during the last hundred years the views of scientists have been much modified, not merely by such far-reaching discoveries as the atomic and molecular composition of ordinary matter, the kinetic theory of gases, and the laws of the conservation and dissipation of energy, but by the more and more important part which electricity and the ether occupy in any representation of ultimate physical reality. To-day we have new theories of matter. There are some who think that all material substances, whatever be their outward form, or atomic constitution, are but electricity itself, the atoms themselves being made up of electrical monads. Others go a step farther, and suggest that these electrical monads may be but a modification of the universal ether. Whether this final unification be accepted or not, it is clear that electrical monads cannot be considered apart from the ether, upon which, indeed, the electric theory of matter depends. If this theory be accepted, we must admit the presence of inconceivable amounts of internal energy, confined within the atoms of apparently inert matter. This aspect of the question is admirably expressed by Mr. Balfour in the following words:—"We can then no longer assume that if the internal energy of a sun were as far as possible converted into heat, either by its contraction under the stress of gravitation or by chemical reactions between its elements, or by any other interatomic force, and that, were the heat so generated to be dissipated as in time it must be, through infinite space, its whole energy would be exhausted. On the contrary, the amount thus lost would be absolutely insignificant compared with what remained stored up within the separate atoms." The stupendous forces lying within and around us, if modern views be correct, may never be of utilitarian value, but they will continue to stir the imagination and to excite the wonder of mankind. All theories of the kind are, however, purely speculative. No one even knows what electricity actually is, nor has the existence of ether been experimentally proved. The unification of physical nature is a most alluring idea, but Mr. Balfour very justly asks whether there is any legitimate reason for expecting that the material world should be a modification of a single medium, rather than a composite structure built out of sixty or seventy elementary substances eternal and eternally different. Reverting to the electric theory of matter, Mr. Balfour shows that it carries us into a new region of thought. In accordance with its teaching, matter is no longer matter, and the atom is merely the theatre in which electrical monads perform their operations. Thus we come to a point which is forcibly expressed by Mr. Balfour in the following manner:—"We claim to found all our scientific opinions on experience; and the experience of which we found our theories of the physical universe is our sense perception of that universe. That is experience; and in this region of belief there is no other. Yet the conclusions which thus profess to be entirely founded upon experience, are to all appearance fundamentally opposed to it; our knowledge of reality is based upon illusion, and the very conceptions we use in describing it to others, or in thinking of it ourselves, are abstracted from anthropomorphic fancies, which science forbids us to believe and nature compels us to employ." Mr. Balfour here puts his finger on a difficulty that cannot be removed until more light is available. Men are still groping for the truth, assisted by a mere glimmering ray of light, and until the hidden secrets of nature are made clear, we must rely for daily guidance upon the phenomena which afford the bases of various departments of applied science. The aspirations of the pure scientist are more exacting than those of the practical scientist. Hence, those who employ matter in engineering and constructive science, may be content to act as if steel, stone, and timber were actually steel, stone, and timber, and to disregard the possibility of their possible electrical or etherial constitution. We regret that space will not permit more detailed reference to Mr. Balfour's fascinating cosmical speculations, which will be appreciated by all true scientists, even if some of the views expressed may be not entirely accepted.

SHAFTESBURY-AVENUE, W.C.—It is stated that Mr. W. G. R. Sprague has been appointed to prepare plans and designs for a theatre, to be erected for Mr. and Mrs. Seymour Hicks, as proprietors, upon the northern side of Shaftesbury-avenue, upon the area bounded by Wardour, Rupert, and Little Rupert streets. The lessee is Mr. Charles Frohman, and the plans will provide for a suite of offices in the upper part of the new buildings.

NOTES.

Live Rails. IN view of the constant occurrence of serious accidents from live rails and overhead wires, it seems clear that the Board of Trade will have to take steps for the protection of the public. Few people will agree with the writer of an extraordinary letter published in the *Times* on the 20th inst., that the public must be educated to take care of themselves, and must leave the pavements at their own risk of treading on live iron covers or rails. This has certainly not been the trend of modern legislation, and although it is true that many of the accidents recently reported have occurred through unauthorised persons trespassing on railway lines, it must be borne in mind that the employees themselves are entitled to protection from unidentified live rails. An unfenced hidden danger, such as this, is entirely at variance with the legislation for factories, under which employees are safeguarded against all dangers on such premises, and on docks and wharves; and we trust similar legislation will soon be passed to prevent this constant recurrence of electrical accidents.

The Motor-dust Problem. NOT only ordinary users of country roads but also the inhabitants of roadside dwellings are beginning to cry aloud for protection from the clouds of dust raised by every passing motor-car. We have ourselves, in common with many of our readers, suffered much from the dust-raising capacity of motor vehicles; but, in spite of personal inconvenience, we are rather inclined to look upon these as blessings in disguise. They have already served to emphasise the fact that our main highways are unsuitable for present-day requirements, and have made it clear that instead of consisting of stone and mud, or stone and dust, according to the season of the year, road surfaces should be consolidated with proper binding material. It is obviously the duty of local authorities and their professional advisers to find materials of construction suited to the requirements of the travelling public. Tar macadam, oiled roads, and roads treated with patented compounds, all afford relief from the dust nuisance, and are available for adoption in all parts of the country. Additional expense must certainly be incurred in connexion with any improved system of construction, and this constitutes the chief difficulty in the way of reform. Non-motorists are fairly unanimous in thinking that motors should be taxed so as to provide the necessary funds; but, on the other hand, motorists contend, and with some show of reason, that the pounding of horses' hoofs, and the grinding action of iron-tyred wheels, are the primary causes of the dust, which is afterwards raised by the wind, and by other vehicles, as well as by motor-cars. It seems, therefore, that the proper course would be to tax all classes of the community alike. But whatever be done, the character of our road surfaces must inevitably be changed, and the sooner this truth is realised the better it will be for everyone concerned.

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Electricity and Matter. THE article on the "Electric Theory of Matter" by Sir Oliver Lodge, which we mentioned recently in our review of *Harper's Monthly Magazine* for August, is worthy of more than a passing notice. He states very clearly the modern electric theory of matter, and gives an outline of its historical development. Maxwell stated thirty years ago that he was ignorant of the precise nature of electricity, but that possibly it might be a form or aspect of matter. Modern theory goes a step farther and says that matter is composed of electricity and of nothing else. Of the "positive" electricity in matter the theory says little, but of the "negative" electricity it makes many definite assertions. Negative electricity consists of excessively minute particles, generally called electrons. In a vacuum tube these electrons fly from the negatively charged terminal, and when they hit anything the impact is appreciable and considerable heat is produced. It is not easy to stop these electrons. A thin sheet of aluminium is practically transparent to them, but a heavy metal, like platinum, is opaque, and the impact produces both light and Röntgen rays. Radium is continually giving off three kinds of rays. The beta rays are formed of electrons and are identical with the rays in a vacuum tube. The gamma rays are a kind of ethereal pulse similar to light rays, and the alpha rays are formed of atoms apparently belonging to a new substance. By measuring the deflection produced by a magnet on the alpha rays Rutherford predicted that the radium emanation was probably helium, and this has been verified by Sir W. Ramsay. It is natural therefore that scientists should regard the surprising results deduced from the mathematical theory as possibly representing the true facts of the case. It has to be remembered, however, that although Newton's corpuscular theory of light explained practically all the ordinary phenomena of light, yet it failed to survive the crucial test devised by Arago. Hence we should not be surprised if some new discovery did not make a profound modification of the modern theory necessary. It seems to us that the fatally weak point in modern theories is their presupposition of an ether in which the electrons of infinitesimal volume vibrate. We would be the last to depreciate the wonderful work done by J. J. Thomson and his pupils at the Cavendish Laboratory, Cambridge, but there seems to us to be a possible danger that the attractiveness and beauty of the hypotheses may lead scientists to neglect some of the less showy theories of the past which still need to be completed and may furnish results of great practical importance.

The Buda Pesth Fire Congress. ONE of the most useful results of the recent International Fire Service Congress in the Hungarian capital was a series of recommendations, drawn up in the form of a resolution which is to be addressed to all the Governments of the world. The relation of chemistry to fire prevention is very properly emphasised, for fire itself is an evidence of chemical action, which can best be checked or neutralised by scientific aid. It is recommended that the owners of mills and factories should be required to organise private fire protection services for the extinction of fires in their first stages, that they should be compelled to notify the authorities of all outbreaks occurring on their premises, and that the danger of fire should be systematically combated by the enforced adoption of fire-resisting construction. Due importance is attached to the use of non-flammable materials in theatres and kindred buildings, and to the employment of fire-resisting decorations in such structures. Finally, the universal application of fire-signal systems in all urban, suburban, and rural districts is strongly advised. There is nothing very novel in the foregoing proposals. They are obviously in accordance with the dictates of common sense, but will never be generally adopted unless made compulsory. Hence the chief value of the resolution seems to be that it will bring the whole subject before the attention of those having the power to make laws and regulations.

Recent Wind Storms in America. WE are told that the tornado is an evidence of the process of adjustment by which the atmosphere regains its stability. This may be satisfactory as an explanation, and the final result may be equally so, considering the matter solely from the standpoint of the physicist. But mere spectators, whether they be property owners or not, rarely enjoy the operations by which equilibrium is restored. This opinion is freely entertained in the United States at the present moment, where we are sorry to find severe storms have occasioned widespread damage and serious loss of life. Experience has shown that no structure, however strongly built, is strong enough to withstand the enormous power of the wind in the funnel of a tornado, and the recent evidences of this fact are particularly striking. Last week property to the value of 400,000*l.* was destroyed at St. Paul, Minnesota, and a steel bridge crossing the Mississippi was practically wrecked, one of the masonry piers being cut asunder by the force of the wind. In the city of Minneapolis, although the storm lasted but fifteen minutes, buildings were unroofed, the fronts of houses were blown bodily in, and a lofty building occupied by private inhabitants was blown down, 200 persons being reported as having been killed by the collapse. The violence of the recent storm at St. Paul is shown by the statement that the tornado moved on its course at the rate of 80 miles an hour, a speed quite irrespective of the velocity of the currents in the tornado-funnel itself.

Proposed Canal Amalgamation. PUBLIC interest is slowly being awakened to the importance of preserving and improving the internal waterways of this country. Manufacturers in Lancashire, in Cheshire, in the Midlands, and in the west of England have been working for some time in the interests of the canals, assisted by various Chambers of Commerce and members of Parliament, among whom Sir John Brunner may be particularly mentioned. The question of a public trust for canals was lately proposed, strange to say, by the chairman of a large railway company, and the same idea was again discussed by Colonel Royds, M.P., at the meeting of the Rochdale Canal Company held in Manchester recently. It is satisfactory to learn from the remarks of this speaker that the Liverpool Chamber of Commerce proposes to take the matter up seriously, and to bring it before the meeting of the Associated Chambers of Commerce in Manchester. The canals touching that centre certainly seem to present favourable features for the arrangement of an amalgamation. A combination of the Rochdale Canal with the Leeds and Manchester, the Bolton and Bury, the Bridgwater, the Calder and Hebble, and the Ashton Catwis canals would provide facilities for an enormous manufacturing district, of which Manchester is the natural centre. While we do not for a moment wish to imply that this is the only favourable opening for amalgamation, it would certainly be a most excellent field for such an enterprise, especially in conjunction with a well-organised scheme of electric haulage.

The Water Supply Problem in Paris. IT is well known that the existing water supplies of Paris are not only inadequate in quantity, but that the supply of drinking water is far from satisfactory in quality. Only last week the authorities found it advisable to issue notices to the inhabitants recommending the boiling of all water intended to be used for drinking purposes. The necessity for increased supplies of better quality has long been recognised, and the question becomes more serious year by year. It is satisfactory to learn, therefore, that a deputation from the Municipal Council is now on its way to Germany with the object of ascertaining the methods adopted in connexion with the water supplies of Berlin, Hamburg, Frankfort, and other large German cities. We do not know whether a similar visit is contemplated to this country, but we think that a week or two spent in examination of the various waterworks of London would well repay the time and expense involved. Considering the comparatively unfavourable character of the sources from which the water of London is obtained and the excellent quality of the water supplied, it is quite evident that the engineering and administrative methods adopted must be thoroughly worthy of imitation by our neighbours across the Channel.

The Convent of St. Clare, East London. THE destruction of the London and North-Western Railway Company's premises by the recent fire which broke out at Haydon-square brings to light some remains that one or two newspapers of last week erroneously described as appertaining to the Priory of Holy Trinity. The fragments consist of two windows and a blocked-up doorway in the wall of Holy Trinity Church in the Minories, which was established there after the dissolution of the religious house of St. Clare, or *Sorores Minores*. The dedication of the church to the Holy Trinity betrayed Cunningham and many subsequent writers into confusing the Convent of St:

Clare with the Priory of the Holy Trinity at Aldgate, on the remoter side of Leadenhall-street. The Priory was established by Queen Mathilda in the first decade of the XIIth century, and as a religious foundation may be said to be now represented by the Church of St. Katharine Cree. The Convent of St. Clare had a later origin, having been founded nearly 200 years afterwards for Sisters of the Order of St. Clare by Blanche, Queen of Navarre, who became the wife of Edmund, Earl of Lancaster. The later name of the neighbouring street is a corruption of Minoresses, by which style the nuns of St. Clare were commonly known.

NOTES AND SKETCHES IN SOUTHERN ITALY.—II.

Ascoli Piceno.

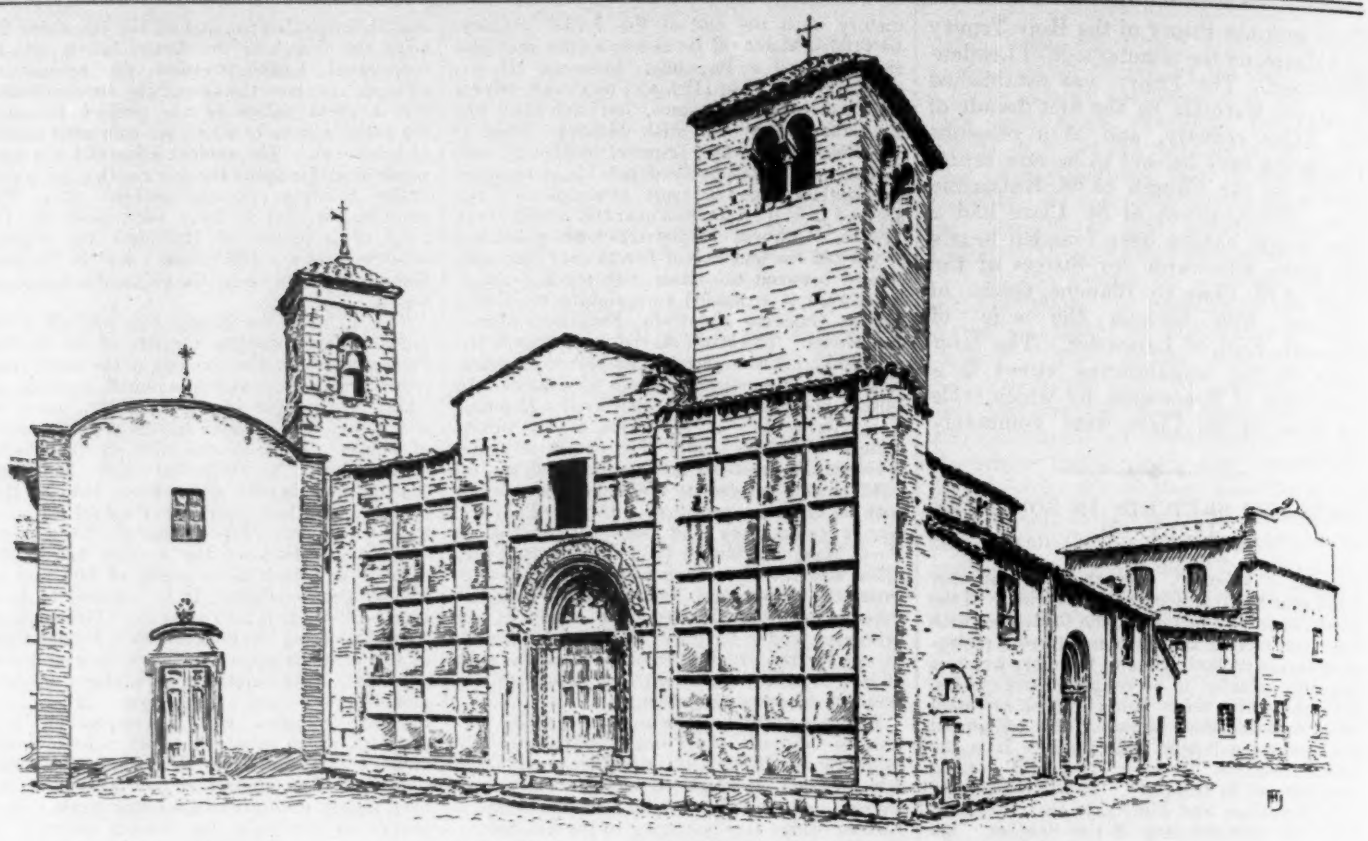
Ascoli "Piceno" (for there is another Ascoli near Melfi) is situated in the valley of the Tronto, near the junction of the Castellano with that river, so that the walls rise from a picturesque ravine on both sides of the city, which is pleasantly situated in an amphitheatre of hills, and bristles with many towers, which are more varied in form than those of the celebrated San Gemignano "delle belle torri." It is the ancient Asculum Picenum, and still retains many signs of its antiquity. It was the capital of the Picentines, and Pliny says that it existed before the transplanting of the Sabines. According to Florus it was one of the principal cities of the federation of anti-Roman Italy. In 299 B.C., however, Rome allied herself with Ascoli against the Etruscans, Samnites, and Senones, but the weaker party went to the wall and Ascoli was subdued by Rome. It rebelled, and took a prominent part in the Social war, giving the signal by killing the proconsul and other Romans. For this it was sacked by the Consul Strabo, and was afterwards made a *municipium*, and from that time remained faithful to Rome. In mediæval times it belonged to the Lombard League, but after a time became Ghibelline. It had a stormy and exciting history until the end of the XVIth century. In 1185 it threw off its bishop's yoke and proclaimed itself a Republic. Innocent III. excommunicated it in 1192, and two years after it returned to its allegiance, but welcomed the Emperor Henry VI. with festival. Then it rebelled against the imperial authority and was sacked in 1242 by Frederick II., so returned to allegiance to the most powerful and was allowed to build a fortress near the mouth of the Tronto, which was completed in three years, and so excited the jealousy of Fermo that long wars ensued between the cities with much damage. After that it struggled to maintain its liberty against Galeotto Malatesta, Francesco Sforza, and others. The latter stayed some time in the city and tried to stamp out suspected conspiracies by erecting quite a grove of gallows. In 1482 it bought the right to call itself a Republic from Sixtus IV. at the price of an annual tribute of 3,000 scudi. The usual struggles between the principal families followed, and in 1535 during an *émeute* the Palazzo Comunale with its archives was burnt. In 1540 Paul III. sent a commissory and built the fortress of Porta Maggiore, but in 1555 the governor was killed and the Pope took away every privilege from the town and refortified the ancient Pelasgic citadel. It regained some of its privileges under Gregory XIII. in 1573, and, except for the excesses committed at the time of the French Revolution, has passed an uneventful existence since then.

The important antique remains include portions of the walls, the Porta Romana anciently called Binata, from its two equal arches standing side by side, through which the Via Salara passed, and the Ponte di Maestro Cecco, a Roman bridge also belonging to the Via Salara. Another bridge, with one fine arch bestriding the ravine, called the bridge of Solesta, is also recognised as Roman; a double gate was erected on it on the city side in 1230 to solemnise the peace between Fermo and Ascoli. There are three other bridges, one of which (the Ponte Maggiore), of three arches and 160 ft. high, was built in 1373 by Massimo and Nicoluccio Ravvolto, Ascolan artificers. Near the Porta Maggiore is the fortress built by Galeotto Malatesta in 1349, remade by Antonio San Gallo and now a prison. The fortress built by Pius IV. on the ancient fort called the Cassero is now called "La Pia." There are also some small remains of a theatre and an amphitheatre, and on the hill above the town the church of the Annunciation, with its conventual buildings (now an agricultural college), occupies the site of the Ascolan baths, and a great palace of the prefect Polimius, the substructures of which are enormous masses of brickwork. The ancient aqueduct has been repaired, and supplies the town with good water. Other buildings occupy antique sites. The cathedral is said to have been built on the ruins of a temple of Hercules: the original substructures are still visible; and S. Gregorio Magno is said to be on the ruins of a temple of Vesta.

The Palazzo Anzianale, the ancient Communal palace, occupies the site of the ancient Palatium Album, the dwelling of the counts and governors, and contains a small museum in which are antique inscriptions, etc., many of which may also be seen incrusted in the walls of houses. It is at one side of the Piazza Aringo, near the Cathedral and Baptistry. The present façade dates from the XVIIth century, but last year the removal of some walls which cut up a portion of the interior into small rooms disclosed the ancient Loggia del Arringo in which the Council of 800 met to discuss public affairs. It is believed to have been built towards the end of the XIIth century, travertine being the material used, though some of the columns appear to have been of brick, plastered. The capitals are cubiform, slightly moulded, as are the bases. There are fourteen columns with corresponding wall pilasters, which support a triple series of round arches about 25 ft. high. The vaulting is quadripartite. The interior of the cathedral has been highly decorated in modern times. In a chapel on the right are several pictures by Crivelli of considerable merit (his pupil, Pietro Alamanni, also worked in Ascoli). The Annunciation by him now in the National Gallery was painted for the Ascolan church of SS. Annunziata to commemorate the concession of communal government by Sixtus IV. which arrived on Lady Day; after which the Annunciation became the official festival of the city. S. Emidius kneels beside the angel and bears Ascoli in his hands.

The town was the outpost of the Pontifical States towards the kingdom of Naples, and has a good deal of XIVth-century Gothic and Early Renaissance architecture in it as befits a place

Ascoli Piceno: Roman Bridge and Mediæval Fortress, now a Prison.



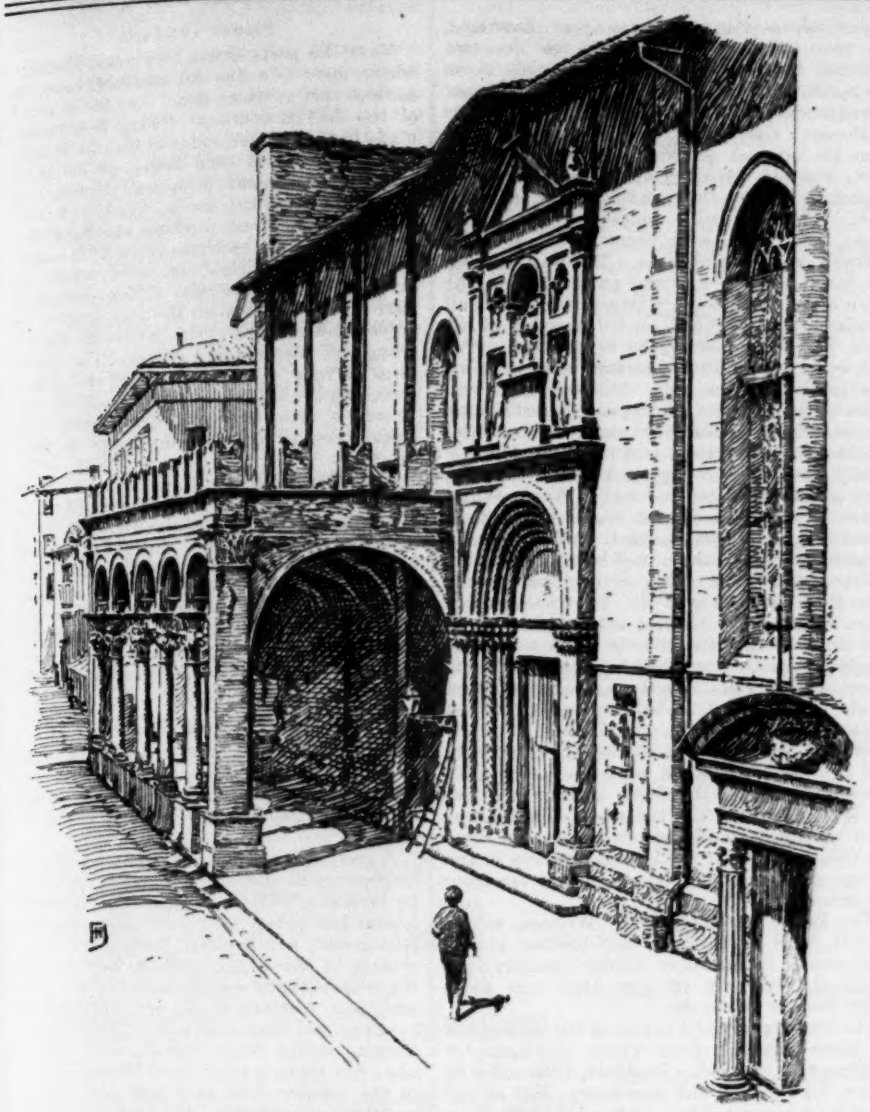
SS. Vincenzo ed Anastasia, Ascoli Piceno.

which was of importance in those times. The church of SS. Vincenzo and Anastasia illustrated, bears a date, 1389, on a stone by the south door. The side doors are both of this period, but the west door appears to be earlier. There is a clerestory of small two-light windows, four on each side, which have the Byzantine block above the capital and small round arches, and the Campanile, which is contained in the rectangular plan, has similar coupled arches with widely sloping caps. Round arches without mouldings are within, resting on square piers with small imposts; the eastern end is apsidal. Another curious church is S. Giacomo, square in plan and without external apse, though the masonry of the east wall shows a large pointed arch. It has a small wheel window in this wall with twisted colonettes radiating to round arches without mouldings. The west door has a damaged fresco above it in the lunette, and resembles that of SS. Vincenzo and Anastasia in design, with two twisted columns in the angles and a dogtooth among the arch mouldings. The design of the scroll of the archivolt is very XIIth century. The side doors had pent-house roofs and are simpler; all are of the XIVth century. The Campanile here is also contained in the plan, and has round arched openings and a conical top above the cornice.

The great church of S. Francesco at the end of the Piazza del Popolo, built in 1269 by Antonio Vipera, has its façade on the "Trivio." The central door has a fresco in the lunette over the door and foolish lions mounted on pillars at the sides. Ranges of elaborately twisted and chevroned pillars are in the jambs, and the arch is flanked by pinnacles, with four rows of sunken empty panels of curiously varied shapes at the top. Those of the side doors have three rows only. The carving of ornament is rich and rather Byzantine in treatment, using the drill a good deal and sharply cut. At the top of each side-band of ornament is a bull's head. The door on the south is somewhat similar, but is surmounted by a Renaissance addition, with very tolerable effect; close to it is the charming Loggia de' Mercanti, a very pretty Renaissance arcade. The interior is very fine and simple in proportion, spacious and quite undecorated. An arcade of five lofty pointed arches serves the nave, then comes a transept, in which the aisle wall is pierced with a double arched triforium and arcade below. There is an octagonal dome with four large and four small sides, with a blind arcade of pointed arches within and small pendentives below. The apse is six-sided and vaulted, and in three of the sides are simple windows. The vaulting of both nave and aisles is quadripartite, that of the nave on a higher level, springing from pilaster strips. The lower stories of the two towers which flank the apse open into the church by similar arches to those in the end of the transepts. The window tracery of the side walls much resembles the quaint shapes of SS. Annunziata, Solmona. Externally the effect is fine and masculine, with broad surfaces and few mouldings. The Piazza del Popolo is surrounded by a XIVth-century arcade, reminding one of Verona or Padua. There is but one story above it and then Ghibelline battlements of brick, shown above the Loggia de' Mercanti in the drawing. In the middle of one side is the Palazzo del Comune, restored after the burning in 1535, but still retaining the earlier tower. The Baptistry is very early, probably of the IXth century. The ground plan is a square and at the angle are pendentives making the upper part octagonal, with an arcade of three arches on each side, except at the west where there are four, beneath a small roof cornice. Beneath each group in the continuation of the square wall is a small window with imposts. Below that on the west side a discharging arch shows. There are doors on the east and south sides and a few antique fragments are built into the walls. The roof, of flat slope, is crowned by a little pinnacle pierced with pointed arches. The door on the east is square-headed, has simple mouldings, and is flanked by square-headed panels; above all three features are triangular sinkings. The south door has a round arch with lintel below formed of a fragment of Comacine interwoven pattern; on the left jamb is a kind of cap, on the other rough volutes. The architrave moulding is rather flat, but much more elaborate than in the other door.

Another interesting ancient building is the Casa Longobarda, which appears to be really of the VIIIth or IXth century, and retains much of its originial appearance. On the upper story there are four double arched windows with central colonettes, the caps to which are queerly shaped and roughly cut, and one has a carved base. One of these windows was ornamented with "scodelle" on the jambs and on the walls near to it. The door is at present round-arched without mouldings, above it is a square-headed window, and there is one to the left of the door with sickle shapes and letters carved on the lintel in low relief. The upper windows have a cable moulding and fillet round the arches, and the spandrils of three of them have carvings very slightly modelled, with the ground sunk round the outline. The first has a castle and two anchors, the second two trees, quite modern in their simplicity and lack of design, the third animals and a hunter chasing them. Above runs a twisted band into which the gargoyles sink. On the side towards the street are also sinkings for "scodelle" and fragments of an interwoven band now displaced. The roof is a lean-to against one of the towers of the mediæval Ascolan nobility, of which there were once 200, with a small square window at the top and ornaments grouped about a round sunk panel. Above the tower door a triangular sunk panel occurs, with a slit across it cut through the wall for light. There are many Renaissance houses, both early and late, with delightful picture-frame-like windows carved with arabesques, balconies, and loggias.

Cola del Amatrice, painter and architect, was born in the Ascolan territory, and there is a painting by him in S. Francesco, but its most distinguished citizen was Pope Nicholas IV. His name was Girolamo di Massio and he was of noble family. He lived long at S. Francesco as a monk and became general of the Franciscans some time before his election to the papacy in 1288. He presented many things to the churches and monasteries of Ascoli, and accepted the office of Podestà. The cope which he sent to the cathedral was stolen in 1902, lately rediscovered in the collection of Mr. Pierpoint Morgan, but S. Francesco still has a cross sent by him preserved in a reliquary made in the XVth century. The cross is of gilded copper with arabesques in filagree, and the reliquary is of silver gilt with sharply-pointed dormers and twisted colonettes on a copper gilt foot, ornamented with translucent enamels of violent colour. It is the work of the Ascolan Pietro Vanni, whose productions may also be seen at Osimo, Bovino, Amatrice, and Castignano, according to M. E. Bertaux. The treasury of the cathedral contains an altar frontal of silver of the second half of the XIVth century, with a number of New Testament subjects in relief in oblong panels, perhaps the work of a local artist; an Italian XIVth-century coffret in ivory, octagonal in plan, and carved with the history of Paris; a reliquary of the arm of S. Emidius, and a silver statue of him of the end of the XVth century. S. Emidius was Germain of Trèves, the first bishop of Ascoli, and is still the patron saint. The reliquary of the arm is also attributed to Pietro Vanni; it is borne on a high base hexagonally starlike in plan, of silver partly gilt and enamelled. Half-length figures are engraved in medallions on the foot. The statue is by the same hand, cast by the *cire perdue* process, and delicately chased afterwards. The border of the cope has subjects engraved on it. There is also a silver statue of the Virgin of the second half of the XVIth century, ascribed traditionally to the Florentine Curzio Compagni, a XVIth-century Crozier, designed by Vasari, and an altar frontal



Ascoli Piceno: Loggia de' Mercanti and Door of S. Francesco.

embroidered in silk, with figures of saints, also of the XVIth century. At S. Pietro Martire is a XVth-century reliquary which was made for a beautiful little angel of French XIIth-century workmanship. XVIIIth-century work is not referred to here, but those who like it will find plenty in Ascoli. F. H. J.

THE ARCHITECTURAL ASSOCIATION EXCURSION.*

Thursday: Milton Abbey.

The train was taken from headquarters at Sherborne to Blandford station, where the brake met the party. Passing through the town the open downland country is soon reached, and a long drive through some really beautiful scenery took the party to the beech woods surrounding Milton Abbey, the church and house nestling together surrounded by lawns and shady groves. The party were shown over the House and Abbey Church, which, from the absence of a nave, forcibly reminds one of the collegiate churches at Oxford. Nothing now remains of the town which once stood grouped round the Abbey, and to-day the deer peacefully browse over the site it formerly occupied.

Early in the reign of King Athelstan a monastery was founded at Milton. This King, at the beginning of his reign, owing to false suggestions that his brother Edwin was plotting against his life, caused him to be sent to sea in an open boat, with only a single attendant. The Prince, overcome with despair at his danger, leapt overboard; but his attendant, amid great danger, swam ashore with the corpse. The King, repenting, did seven years penance at Lampont and afterwards founded the Abbey. Whether this legend be true or not one cannot say, though much doubt has been thrown upon it. Considerable remains of the Abbey may still be traced, and it does not appear to have been treated with the ruin and havoc which generally attended religious houses immediately after their dissolution. It formed a long square and stood upon somewhat rising ground, close by the church. The north front, according to Hutchins' "History of Dorset," was a very low, ancient row of buildings with small narrow windows, probably the monks' dormitory. You entered by a large gate into a small court surrounded by irregular buildings; passing this you entered the hall through a porch. This hall, which still exists, is a stately and magnificent old room, almost exactly a double cube; it is 53 ft. in length; at the higher end is a date, 1498, when the building underwent repair. Fortunately when the House was rebuilt by Sir William Chamber this old hall was judiciously preserved, and is in its original state, with a splendid hammer beam roof in six bays, with moulded and curved supports to its purlins; the intermediate trusses are supported by lions. It is a very perfect specimen of a monastic refectory. In one of the rooms hangs a most interesting plan, "An exact Surveie and Plan of the Manor of Milton Abbas, 26 Aug. 1652. Philip Byles surveior." The Abbey Church was restored in 1865 under the supervision of Sir G. G. Scott.

* Concluded from last week.

Piddleton Church.

Here the party had luncheon amid somewhat homely surroundings, and the brakes drove to the town of Piddleton, where the church was inspected. It consists of a chancel, nave, and south chapel, the tower being on the west side. The font is an interesting example of unusual form, with an interlaced diaper pattern, possibly dating from the XIIth century. The interior is very quaint, and the original disposition of Jacobean pewing, recalls the days of our great-grandfathers and the long discourses they were obliged to listen to. The south transept arch is panelled exactly like Sherborne Abbey, and, indeed, this characteristic was very noticeable in several of the churches visited, all of which had no doubt obtained their inspiration from this great mother church. The windows are of good tracery and irregularly spaced. On the south side of the nave an extremely interesting chantrey contains several monuments to the Martin family, with several remarkable alabaster figures; one especially under the nave arch is of great interest to the student of armour, and dates from the latter part of the XVth century.

Waterson House.

From here the drive was continued to Waterson House, where the party were entertained to tea. This house is said to have been built by Thomas, second son of the first Viscount Bindon; later it belonged to Sir John Strangways. The house is three stories in height, with gables and a high-pitched roof. On the south side is a Jacobean porch with round archway flanked on either side by Doric columns; above, the porch supports a quaint semi-circular bay running to the second story and surmounted by an open balustrade. On the east side of the house is an interesting gable of Jacobean design, which has been unfortunately much marred by later insertion of square windows.

After inspecting the House, the party drove on to Dorchester, where the train was taken to Yeovil, and a drive of a few miles brought the party to their headquarters.

Friday: Yeovil Church.

This was the red-letter day of the excursion, and an early start was made from Sherborne for Yeovil, where the party visited the parish Church of St. John, situated in the older part of the town. It dates from an early period. The building now used as a sacristy is of Early English date, but the main fabric is principally Perpendicular in style. The tower is at the west end, and there is a wide nave, with aisles, transept, and a chancel of considerable length. The tower is of a simple design without the usual pinnacles. The parapet is rather different from the ordinary type, and consists of perforated panels with cusped heads. The nave of the church is on a level with the chancel. The same treatment is apparent in the aisles, the windows being in recesses between the stone shafts which support the roof trusses. The church is well lighted with five-light windows, owing to which feature it has been termed the "Lantern of the West." The nave arcade is of slender proportions, and is continued through the entire length of the choir but not the chancel. The brass lectern is an original one of a fine bold type.

Tintinhull Village.

The drive was then continued to the quaint village of Tintinhull, a typical mediæval village, just over two miles from the ancient town of Ilchester. The Fosse-way runs from one end of the parish to the other. In the time of Edward the Confessor the manor was held by the Church of Glastonbury, though how it became in her possession is a matter only of conjecture. There are a very complete set of church records, which shed much light on the history of the place, dating from the early XVth century. The church is a very small one, without aisles. The tower is situated on the north side of the nave. The principal features are Early English, but some of the windows belong to the perpendicular period. The porch has a simple arched stone roof, with massive ribs. Many of the bench ends are ancient. Adjoining the churchyard a gateway leads to the rectory, part of which appears to be of early XVIIth century date.

Then some of the party visited an old house in another part of the village, quite a gem of its period, originally an early XVIth century building; a classic front was added possibly in the days of the Woods of Bath, or even earlier. It recalls the best classic traditions of Inijo Jones; the windows have mullions and transoms. The whole is surrounded by a charming formal garden, which owes much to the taste of its present owner. On the west front are two grass courtyards, with good stone piers, and hard by is a bowling alley, with several other enclosed gardens. The delights of colour kept many of the party at this house, but others found much of interest in the old-world village and varieties of cottage buildings. A halt of about two hours was made here, and then the excursionists drove on to Montacute, where Mr. Philips most hospitably entertained the party to luncheon.

Montacute House.

On one side of the village green is the entrance to Montacute House, and following an avenue we find ourselves before the beautiful west porch of the mansion. This consists of an ogee arch surmounted by a beautiful panel of richly-carved Italian workmanship; two

vigorous putti support the armorial bearings of the house, set within a lozenge; angle columns, rising to a quatrefoiled parapet, are surmounted by fantastic statuettes upon twisted columnar bases. The craftsmanship displayed in the enrichments is of a most delicate and chaste character. The whole front shows by its refinement of detail and simplicity the very best traditions of the period. This porch and its adjoining wings were brought from Clifton Maybank House, which was visited on Wednesday. Extracts from the manuscript accounts of the building are still preserved, wherein the then owner of Montacute says, "1786. On May 2, my wife and self attended the sale of materials of Clifton House, then pulling down. We bought 600 ft. of plain ashlar stone for Cattistock—the porch, arms, pillars, and all the ornamental stone of the front—to be transferred to the intended west front of Montacute, besides which we purchased the chimney piece in the withdrawing-room, some windows, some wainscote, lead, marble, etc." "1787. Proceeded briskly with my building the west front, and on June 16 I was enabled to pull down the scaffolding. This year was remarkable for building the west front of Montacute." It is not often that an addition annexed to an old building in this fashion is a success, but certainly in the case of Montacute the addition has added much to the appearance of the façade.

Montacute House was built by Sir Edward Philipps, Queen's Sargeant, Master of the Rolls, and Speaker of the House of Commons. The famous quarry of sandstones on Ham Hill, not many miles away, supplied the material, and the building operations extended over a considerable period, having been commenced in 1580, and only finished twenty years later. The plan of the house is simple, being that of the letter H. The two long fronts face north-west and south-east. What perhaps strikes one most is the great height of the building; it has four floors, all of them containing noble rooms. The balustrade of the before-mentioned addition to the west front is broken by a series of griffins and other heraldic animals, supported on fluted and twisted shafts, with mouldings giving a sharp and brittle appearance to the façade. The designer has also very successfully succeeded in breaking the sky-line with an effective open balustrade, with the usual Elizabethan pyramid blocks on the intermediate piers. The long, narrow, lights of the windows serve to emphasise the lofty character of the building. This is particularly noticeable in the south-east front, where considerably more than one-half of the entire front consists of window space. The two projecting wings of the south-east façade enclose an oblong paved space raised slightly above the garden level. Above, in niches, is a series of the nine worthies. The great size of the house gives evidence of the hospitality our forefathers of Queen Elizabeth's days knew so well how to dispense, aptly illustrated in the two inscriptions: one on the front entrance, "And yours my friends," and another over the garden porch, "Through this wide open gate, none come too early, none return too late." There are many fine old family portraits in the house, and at one end of the great dining hall the old Somersetshire fashion of Skimmetry or Skimmenton riding is depicted, in which the victim for certain misdeeds is condemned to be carried round the village on a pole. We were told that this custom had not yet entirely died out. The party were shown round the interior of the house, and the great gallery on the top floor with its two huge semi-circular oriel windows was of great interest.

In the house is preserved a rare specimen of the handwriting of Inijo Jones, being a receipt for 100*l.* paid to him by Sir Edward Philipps, Master of the Rolls, for money disbursed in connexion with a masque presented before the Court at Whitehall in 1612.

The garden is one of the greatest of Montacute glories; moreover, it has attained an exalted place in the annals of English gardenage. Though by no means of large extent, its design embodies many of the best features of the age of its creation, and very successfully combines the architecture and character of the house with the immediate surroundings. The wing walls thrown out from the main building, the noble terrace overlooking the lower garden, the old-world pond, with its balustrade and fountain, and the quaint pavilion, all reflect the architectural style of the house. Avenues extend across the park in several directions, the two principal ones leading to the two principal courts. The present entrance is on the north-west side of the house. The former entrance forecourt was on the opposite or south-east side. This court now diverted from its original purpose is enclosed on all sides, but old drawings show the wing walls extending beyond the garden-houses into the park. These enclosing balustraded walls are about 7 ft. high, with piers placed at short intervals, enclosing obelisks. Mid-way between the main building and the garden-houses the continuity of the wall is interrupted by small circular stone pavilions, each consisting of six stone pillars, supporting an ornamental soffit, with open cupola above, formed of three stone ribs joining at the top. This is again surmounted by a finial of interesting stone circles. The garden-houses are very quaint and beautiful specimens of their kind, and their equals could hardly be found in England. The beautiful tints of the lichen-covered walls, the greys and greens of the ogee-shaped slated roofs, their round bays, pillared angles, and curiously-shaped parapets, make a very beautiful picture, and one which not a few of the party made more than a mental note of. The upper garden extends on the south-west side of this court, and on the opposite side is a large sunken garden, overlooked by a broad terrace, extending around all four sides. In the centre is a fountain pond, enclosed by a balustrade, its angles accentuated by obelisks, round which a happy colony of white pigeons ceaselessly flutter to and fro. So enamoured were the party with the charms of the Jacobean architecture and the lovely garden, that the whole of the afternoon was spent at Montacute House, but some few found out other interesting features in the village grouped round the green not far from the house.

The Priory was founded by William, son of Robert, Earl of Moreton, half-brother to the Conqueror; it has now almost entirely disappeared, the only remains that now exist being the old gatehouse.

The founder owned a castle on the conical hill—"Mons acatus," from which the name of Montacute is derived. Reginald, Chancellor to Henry I., enlarged the monastery, and at the same time converted his castle on the hill into a chapel, dedicated to St. Michael. Scattered round the neighbouring fields are many remains of the ancient abbey foundations, and no doubt Montacute House itself was largely built from the ruins. The gatehouse appears to have formed part of a suite of offices, for it has spacious apartments on the east side consisting of two stories, and also a handsome chamber over the gateway. The gateway is very high, probably so constructed for the hay waggons coming to the Abbey farm. On the south front are two octagonal turrets, the lower one leading to the first floor of the adjoining house, the other to a room over the arch and to the leads. Montacute was the only Cluniac house in Somersetshire, and before 1414, when the alien priories were suppressed, Montacute, on renouncing its allegiance to Cluny, was allowed to continue its work until the general suppression in 1539.

The church at Montacute has a splendid Perpendicular tower, which has been added to its west end; it is not so tall or stately as many of the Somersetshire towers, but the work is very graceful; a staircase turret runs up the whole way and springs from the ground.

The church itself is, however, essentially of an earlier type, and has a good Norman chancel arch of three orders. The principal part of the church belongs to the Transition period between Early English and Decorated; the south transept arch belongs rather to the former style, the north to the latter. Probably all are parts of one renovation, between the accomplishment of the various portions a great deal of time being allowed to elapse.

Not far from Montacute is the diminutive village of Odcombe, the native village of the celebrated traveller Coryat, who upon being shown the palace of the Elector of Cologne at Bonn, and asked whether there was any palace in England equal to it, said, "There is one in mine own county of Somersetshire, even the magnificent house of my most worthy and right worshipful neighbour and Mœcenas Sir Edward Philipps, now Master of the Rolls, in the town of Montacute, so stately adorned with the statues of the nine worthies, that may be at least equally ranked with this of Bonna if not something preferred to it."

Preston Plucknett.

Next the party drove to Preston Plucknett, where there is a fine old mediæval house, the earliest part of which dates from the latter half of the XIVth century. Owing to alterations made in the interior, many of the most interesting features have been destroyed, but in the exterior an elegant octagonal chimney, with open work at the top, has been preserved.

Close by the house is a barn standing at right angles; it is a fine specimen of the XVth century. The roof is the original one, and is in good condition; it is very probably of Spanish chestnut. Part of the old finial on the apex of one of the gables still remains. This is also the site of a grange of Bermondsey Abbey. The remains form a very picturesque group of buildings, especially the hall, groined porch, and tithe barn. There is also an octagonal chimney with double tiers of pierced panels, now no longer in use.

This little place, quite one of the tit-bits of the whole excursion, practically completed the visits away from headquarters, and Friday evening was spent in the usual convivial manner. After dinner a smoking concert was held in the Digby Hotel, and votes of thanks were passed to the President of the Association for having presided over the meeting and also to the two honorary Secretaries, whose indefatigable energy contributed so largely to the success of the tour.

Sherborne.

Saturday was devoted to seeing the sights of Sherborne, as most of the members were obliged to leave during the afternoon, and first of all the grand old Abbey church was visited.

A good deal of information with regard to the archæology of Sherborne Abbey was contributed by Professor Willis to the *Journal* of the Archæological Institute. As it now stands, Sherborne is externally a rather lofty, though not very long, church of late date, built of freestone from Hamdon Hill and quarries near the town. Here and there Norman details are apparent in the exterior, and more especially in the interior, the crossing arches being Norman except the east one; but there is much more Norman influence in the interior even as it now stands than is apparent at a glance. The early foundation is of the Saxon period, and to that succeeded in due time the Norman church, of which there now remains the crossing piers and the portion of the tower below the roofs, the lower stage of the south-west porch and some minor portions. A Lady chapel was added in the Early English period. About 1436 the work of rebuilding the choir was commenced on the Norman foundations, and also a new upper stage to the tower; and it was about this period that a fire took place which was a notable incident in the annals of the church. The church has been restored under the supervision of Messrs. Slater and Carpenter. The interior of the nave, which has been very carefully restored, presents a fine and unusual effect. It has exceptionally solid arcades of the Perpendicular style. The impost is marked by a small cap to one of the roll mouldings on either face, a rather unusual treatment, and one so small that it hardly strikes the eye. The wide hollows in the piers are given an unusual effectiveness by being made to assume the appearance of a succession of shallow niches by the introduction of trefoil heads at regular distances. The unusually massive character of the piers for their date arises from the fact that, as at Winchester Cathedral, a great proportion of the masonry of the Norman piers was retained as a core and cased with the later stonework. The vault is a remarkably fine and effective one, of the date when the assemblage of ribs was just beginning to suggest the form of a complete fan vault, the plan of the main compartments assuming a polygonal form. The crossing is wider from north to south than from east to west; on three sides it has Norman arches with plain square soffits, springing from caps of the ordinary type, with coupled wall shafts below; the western arch is segmental, the north and south ones stilted. The north transept is very similar in character to the nave; the south transept has a fine, massive timber roof of low pitch. The great south window of this transept was designed by Pugin. The tower at Sherborne has gone through many perils, and in 1830 measures had to be taken to preserve it, and secure the safety of the peal of bells which are said to be the heaviest swinging peal in England. (The largest bell weighs nearly 3 tons.) In our issue of April 3, 1897, we published an account

of the Abbey, together with a plan and exterior view.

The domestic buildings of the Abbey were arranged on the north side on a site now occupied by the Grammar School; the principal buildings were grouped round the cloister court, in the centre of which stood the conduit, now removed to the market place. The cloisters were built by Abbot Frithe in 1349-1371, but almost all traces of them have now gone and their position is occupied by the lawn of the headmaster's house. On the east side of the cloisters stood the monks' dormitory with chapter house below, the day room, parlour, and slype; on the north side were the refectory, abbots' lodging, and kitchen, and the west side was entirely taken up by the Guesten hall. The original Sherborne school occupied a site at the east end of the Abbey church. The present building dates from 1670, when the Governors began to rebuild the schoolroom, which had existed since 1555. It is supposed that the foundation of the school is contemporary with the Abbey, and therefore in 1905 the school will have been in existence 1200 years. In 1540 the old schoolhouse of Sherborne was granted by Henry VIII., together with the rest of the monastry, to Sir John Horsey, who afterwards sold the Abbey church to the town, and the monastic buildings were leased to the Governors of the school. In 1550 Edward VI. refounded the school upon the petition of the townsmen and inhabitants of the whole neighbouring county.

Next the castle was visited by a few members who were more archæologically inclined, but there are not very extensive remains to be seen now. This closed the programme of the tour, which many members will number amongst the most interesting which have been undertaken.

PLAN OF JUMIÈGES ABBEY.

By the kindness of Mr. Phené Spiers, who has supplied us with the materials, we are enabled to give this sketch plan of Jumièges. Illustrations of the building appeared in our issues of August 6 and 13.

THE DRAINAGE OF A HOUSE.*

So long as cast iron pipes can be kept free from corrosion they may be regarded as being satisfactory for drainage purposes. Corrosion, however, soon sets in, with the result that the velocity of flow of the sewage matter in the pipes is seriously impeded, and the efficiency of the drain is lost. To counteract corrosion several expedients have been adopted, of which the best known is Dr. Angus Smith's solution; then there is the Bower-Barff process of forming a magnetic oxide of iron on the surface of the pipe; and lastly, by lining the pipe with what is termed *glass enamel*.

A short time ago the writer got the various preservatives on cast iron pipes tested with a weak solution of sulphuric acid, and the following are the results:—

The first experiment was made on a glass enamelled pipe, and, on being immersed in a 1 per cent. solution of acid, the enamel was immedaitely affected, and at the end of twenty-four hours the enamelled skin resembled a piece of damp blotting-paper.

The next experiment was made on a pipe treated by the Bower-Barff process, but this time a weaker solution was used, 1 part acid to 200 parts water, and the result was that all the oxide was removed. The acid acted upon the pipe whenever it came in contact with it.

The last experiment was made on a pipe coated with Dr. Smith's solution. This pipe was also immersed in a ½ per cent. solution, and at the end of twenty-four hours the skin was all peeling off.

It may be argued that a system of house drainage is not required to stand the action of acids, and that the above tests are no guide as to the suitability of cast iron pipes coated with one of the preparations mentioned for the carrying away of soil and waste from our dwelling-houses. The writer, however, holds the opinion that a drain should be able to stand the action of any liquid which may be poured into it. No objection on this point can be made against fireclay pipes, if first quality pipes be used. At the same time as the experiments were made on the cast iron pipes, a fireclay pipe was immersed in a 5 per cent. solution of acid, and the acid had no effect on either body of pipe or glaze.

An advantage of cast iron over fireclay piping which is brought forward is the ability of cast iron piping to stand hydraulic pressure; but is this required? The following tests to find the pressure that a drain pipe requires to stand, and the strength of a fireclay pipe, were made for the purposes of this paper:—

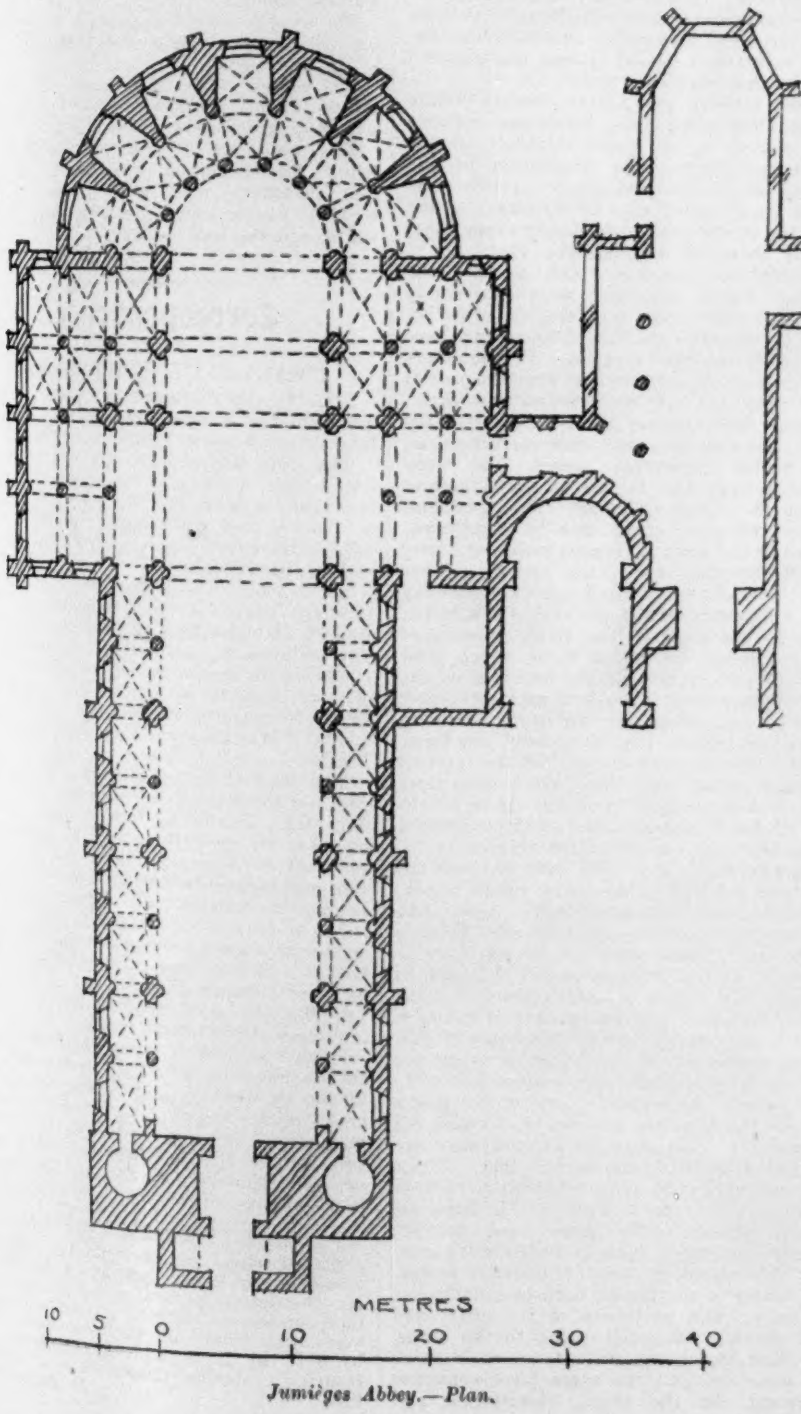
A wash-down closet was tested with a pneumatic pump and the pressure found necessary to break a water seal of 2 in. deep was ·120 lb. per square inch, while to break a seal of 3 in. deep required a pressure of ·145 lb. per square inch. A 4-in. diameter fireclay pipe was tested up to a pressure of 45 lb. per square inch, but showed no signs of porosity at the faucet. This test showed that a fireclay pipe will stand a heavy internal air pressure before bursting, but to find the exact pressure that a pipe would stand and still be air-tight another pipe of the same size was taken and tested. The pressure was gradually increased at intervals of ten minutes, from ·5 lb. till a pressure of 3·3 lb. was reached, and the mercury in the manometer remained steady at that pressure for twenty-four hours. From this we may judge that this pipe was capable of standing a pressure of 3 lb. per square inch, or fully twenty times the pressure required to break a 3-in. seal of a wash-down closet. This is a sufficient margin for all practical purposes.

To test the efficiency of embedding a fireclay pipe in concrete, a second quality pipe was put under a pressure of 5 lb. per square inch, but it was so porous that the mercury in the manometer fell 3·5 in. in twenty minutes. The pipe was then encased in 6 in. of concrete, and, at the end of three days, the test was again applied with the following result. The pressure was applied gradually at intervals of half an hour, commencing with ·5 lb. of pressure. There was no sign of leakage up to 3 lb. of pressure, but when 4 lb. per square inch of pressure was applied, the mercury fell ·1 of an inch during half an hour. From this it will be seen that a 6-in. layer of concrete round a pipe makes the pipe sufficiently air-tight.

A further test of the strength of fireclay pipes was made, this time by hydraulic pressure. They were tested up to a pressure of 250 lb. per square inch without showing signs of fracture, but showed signs of porosity in one pipe at 60 lb. of pressure, and in another at 100 lb.

Another argument against the use of fireclay pipes, is their liability to fracture through any unequal settlement of the ground on which they are laid or of the building they pass through. The liability to fracture through unequal settlement of the ground on which they are laid may be overcome by the laying of a bed or layer of concrete underneath the pipes, and if the ground is very soft or unequal, the writer would suggest that by the use of ferro-concrete it may be overcome. If sufficient size of openings is formed or left in the walls, and these openings are properly linteled over with a space between the lintel

* Part of an abstract of a paper by Mr. Samuel Smith, read at the recent Glasgow Congress of the Sanitary Institute.



Jumièges Abbey.—Plan.

and the pipe, there is no fear of any damage being done to the piping through any settlement that may take place in the building.

Another point of importance in connexion with the laying of fireclay pipes is the nature of the joint and the material to be used for making the joint. By the introduction of faucets such as the Hutcheson or the Fitzpatrick faucets, a more satisfactory joint can be made than is possible with the ordinary spigot and faucet pipes, even although rope-yarn is used. The writer recommends that nothing but a slow setting cement, thoroughly cooled and aërated, be used, and that it will be well staved into the joints so that all the air in the cement be forced out, and a thoroughly air and water-tight joint will be the result.

We are all familiar with the objections to cast iron being used for the trunks of closets and for sinks. The same objections can be applied even more forcibly against the use of cast iron pipes that are to be buried underneath the ground, when fireclay pipes, as has been shown, can be got which will make a tight enough job and be more satisfactory, as there is no fear of corrosion, and you can empty any kind of liquids into them with no fear as to the result.

While efficiency is the point to be looked at in planning a drainage scheme and selecting the materials for the same, the question of cost has also to be taken into consideration. On looking into the comparative costs of fireclay pipes laid in the manner here suggested, including costs of concrete, and of cast iron piping coated with Dr. Smith's solution, the writer finds that the cost of cast iron, or straight piping, exceeds that of fireclay by from 15 to 20 per cent. The increase in the cost of bends and branches is 50 to 60 per cent., while on traps it is 300 per cent. It will thus be seen that, for a drain laid with fireclay piping, the advantages of being more efficient and economical can be claimed.

The writer would suggest that fireclay pipe-makers test their pipes to say 60 lb. of hydraulic pressure, and sell their pipes with a guarantee that they will stand that test. If this were done the users of pipes, in the knowledge that they were getting a satisfactory article, would readily pay an additional 10 per cent. on the cost of them, and the result would be more satisfactory to all parties concerned. Improvements have been made in recent years on fireclay pipes, and further improvements could and would be made if makers saw that it was to their advantage to do so, through there being a demand for a superior article.

Illustrations.

ST. GEORGES DE BOSCHERVILLE.

THE chronology of the Church of St. Georges de Boscherville has been much disputed. De Caumont held that the present church is that which was built between 1050 and 1066 by Raoul de Tancarville, and the French Society of Archæology in 1849 put up on the aisle wall a marble slab with an inscription to that effect. But a comparison with such early Romanesque work as that of Bernay and Jumièges makes this date entirely inadmissible. A more advanced date was proposed by Georges Bouet in an important paper on the church in the "Bulletin Monumental" for 1867, and has lately been accepted by M. Besnard—viz., that the church was built between 1075 and 1090. In opposition to this, it may be urged that it is far more advanced in style than St. Nicholas, Caen, which is known to have been built in 1083; from the style of work there would seem to be an interval of twenty or thirty years between St. Nicholas and St. Georges. Characteristic features of XIIth century work abound. The church is admirably lighted, the windows and the bays being broad. The joints of the masonry are fine. The piers have their members scientifically disposed with reference to their load, six columns supporting the two orders of the pier-arches, one the transverse arch of the aisle vault, the remaining one being carried up as the roofing or vaulting shaft. Throughout the church the tendency is not to carve but to mould each arch; those of the crossing, the ground story, the transeptal galleries, the triforium, the clearstory, and many of the windows have roll-mouldings of considerable refinement, such as may be paralleled perhaps at Norwich, but hardly in Normandy. The capitals, too, are of advanced type; the scalloped cap is frequent, and Corinthianesque capitals abound of much higher type than those normal to Normandy in the XIth century, which consisted of little more than four clumsy volutes, with the band of acanthus usually omitted. Nearly all the bases also have the spur-ornament, which in England, at any rate, is rare till the XIIth century is well advanced; those of St. Peter's, Northampton, which can hardly be earlier than 1135, and the crypt of St. Peter-in-the-East, Oxford, are early examples. M. Besnard appears to see the force of this cumulative evidence for a XIIth century date. He tries to dispose of it by assuming a general *ravalement* of the whole church at a later period than 1090; but though this might apply to the carving of capitals and archivolts, it can hardly be assumed that the windows were enlarged and the arches moulded at a later period; in any case, wide joints of the XIth could not be converted into fine joints of the XIIth century. And, as we know that William, son of Raoul de Tancarville, supported by Henry of England and Archbishop Geoffrey of Rouen, "volens ecclesiam sancti Georgii ampliare et meliorare," converted the collegiate establishment of secular canons into a convent of Benedictine monks in 1114, it is probable that this gives us the initial date for the building of the church. But since the monks, requiring dormitories, refectory, etc., at once, may have first built their claustral buildings, retaining for a time Raoul's XIth century church, the present church may quite possibly be a work of the second quarter of the XIIth century. In our own country, when regular were substituted for secular canons at St. Frideswide, Oxford, where there was an existing church still probably in substantial repair, it was the claustral buildings that were built first.

In the interior the XIIIth century vaults are not abutted by flying buttresses, reliance being placed on the great thickness of the Romanesque walls. The disposition of the vaulting shafts is exceedingly curious. At present each one appears to terminate at the sill of the clearstory, but in reality every other shaft is continued through the vault up to the top of the clearstory wall, so that the vaulting shafts originally were alternately long and short. Of the shorter vaulting shafts in the nave the fourth and sixth have retained Romanesque capitals. All the others have had new capitals inserted when the present vaults were built. It would follow that originally the tall vaulting shafts supported tie-beams, but that the short ones carried gabled semi-circular transverse arches. The same roofing system was in use at Cérisy-la-forêt and at St. Vigor, Calvados. The treatment of the triforium stage also is remarkable. Instead of the great cavernous arches of Cérisy and St. Stephen, Caen, the arcade consists of four arches not embraced under a containing arch; and, owing to the omission of this latter, the triforium stage is low; so the proportions of the interior are rather those which later found favour in the Gothic interiors of the Ile de France and in England at Westminster and Beverley, where the triforium tends to occupy one-sixth, the clearstory one-third, and the ground story one-half of the internal elevation, rather than those which were more usual in Romanesque churches. It is to the ratio of the dimensions of the three internal stories that the success of the interior of St. Georges is largely due. We may compare the triforiums of the Abbaye-aux-dames, Caen, and of St. Saviour's, Southwark. Again, like the Abbaye-aux-dames and unlike the Abbaye-aux-hommes, Caen, there are no windows in the back wall of the triforium. All this is characteristic rather of XIIth than of XIth century design. It is curious that in the nave the triforium arcade consists of a series of cells neither communicating with one another nor with the triforium chamber behind.

As regards the supports, none of the shafts are carved, none are grooved or banded, all are smooth. This may be because they are not monoliths, but in coursed masonry. In the ornament employed the predominant motives are the fret, chevron, and cable. The bases are mainly variants of the Attic base, and are remarkably clumsy, both in design and execution. The windows are of uniform design, with shafts in the jambs, both externally and internally. The buttresses of the aisles and clearstory are flat strips rising to the eaves, and their angles are shafted, as at Norwich and Peterborough; the apses have columnar buttresses. In the aisles, clearstories, and transepts the abaci of the window shafts are continued as strings; there is also a continuous string beneath the aisle windows. The corbels of the corbel-table present a great variety of bold Romanesque sculpture. The orientation of the church is from south-east to north-west. The most important work on the church is the quarto of M. Besnard, architect, published in Paris, 1899. It contains plans, sections, and many engravings; the text is full and accurate; the plans are without scale, do not agree with the text, and contain inaccuracies. A valuable criticism of M. Besnard's monograph, by Dr. Coutan, was published in 1899 at Sotteville-les-Rouen. Plans and sections are also given in the second volume of Ruprich-Robert's "L'Architecture normande." The illustrations of St. Georges in Cotman's "Normandy" are useful, having been taken before an unnecessarily drastic restoration, in which the plaster was stripped off, the ashlar, columns, mouldings, and sculpture worked over, and the jointing emphasised—one of the evil deeds of the Commission of Historic Monuments.

SKETCHES WITH THE ARCHITECTURAL ASSOCIATION EXCURSION.

THESE sketches are given in connexion with the annual excursion of the Architectural Association, our report of which is continued this week on another page.

A COUNTRY HOUSE.

THIS house was designed for a site near Havant, on the main road between Chichester and Portsmouth.

The reception-rooms look south towards the sea—six hundred yards away—and one end of Hayling Island.

The garden extends from the house to the shore. There is a walled garden on the west and a kitchen garden and stables on the east.

The walls are of red brick with thick joints; the windows are either leaded lights in iron casements with stone jambs, etc, or wooden double-hung sashes painted ivory white, and the roof is tiled.

CHARLES J. BATHURST.

Correspondence.

UPSALA CATHEDRAL, SWEDEN.

SIR,—In the Cathedral of Upsala, Sweden, are a number of sepulchral monuments, two at least of which are of considerable interest.

The Lady Chapel, east of the choir, is the burial place of Gustavus Vasa. His monument is a massive altar tomb of large dimensions, on the top slab of which are three recumbent effigies, the centre one being Gustavus himself and on either side two of his wives. The date is about 1565. The style of the monument is thorough English Renaissance, and the material English alabaster from Chellaston, Derbyshire. The sculpture is good, and the orphery enrichments on the dresses are of precisely the same delicate character as we find on Queen Elizabeth's, Mary Queen of Scots', and similar monuments in Westminster Abbey and elsewhere in England.

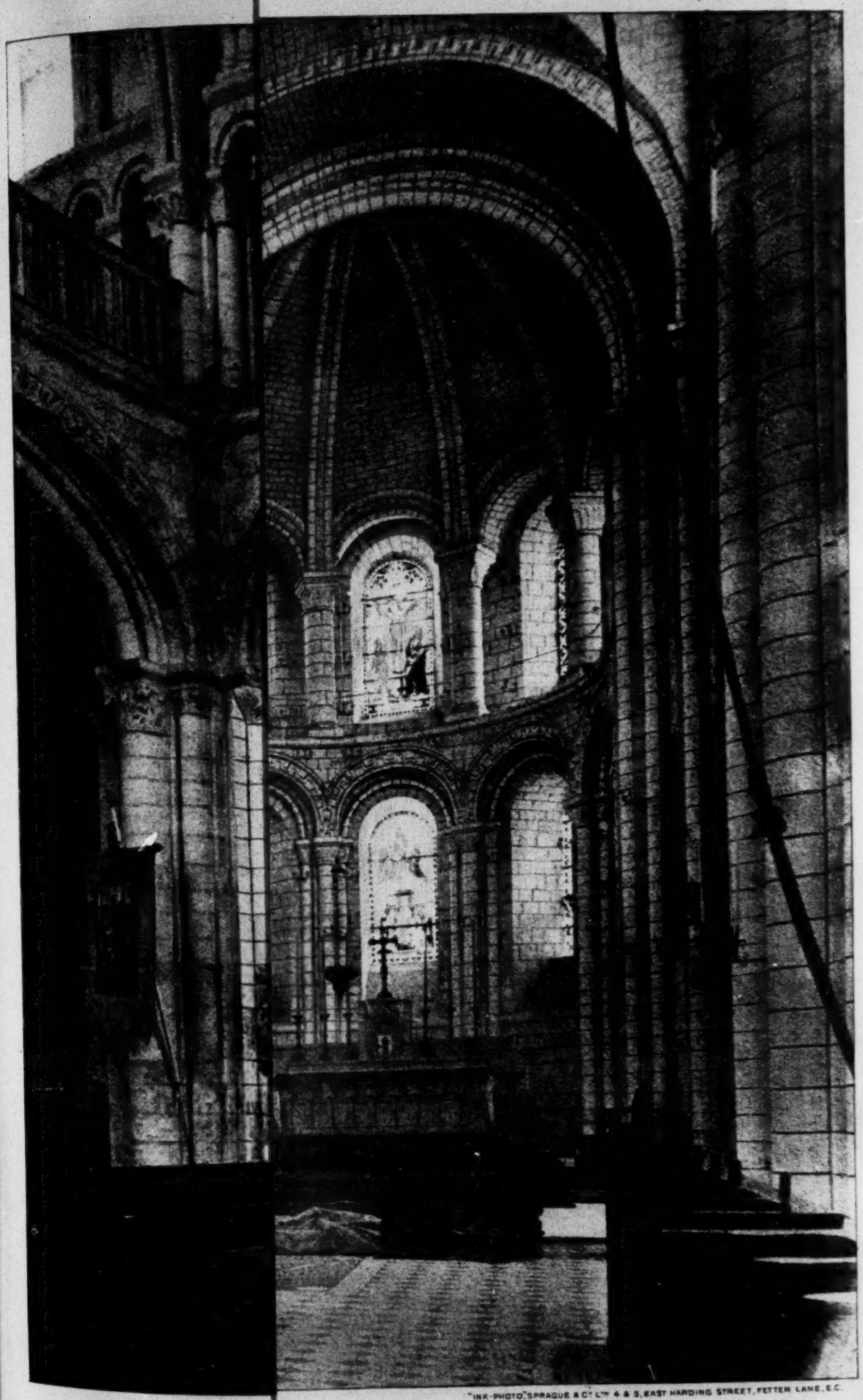
The other of special interest is a large wall pedestal monument, with statues life-size of John III. This is said to be in marble, and is stated in the guide-books, etc., as having been executed in Italy in Italian marble. It is supposed to have been wrecked on its way from Leghorn to Sweden, and, after various vicissitudes, to have finally reached Upsala.

Now, my firm opinion about this monument is that it is the same as the first—viz., the material is English alabaster, and the workmanship English. Sweden has no alabaster rocks, and the material is not Italian.

I could imagine that from mediæval times to the English Renaissance there was probably at Chellaston, Derbyshire, a continuous "atelier" of sculpture; and it is a question if the same remark does not apply to the Isle of Purbeck and statues in Purbeck marble, which have precisely the same mannerisms wherever found, in places however remote. W. BRINDLEY.

BRICK-BUILT STRONG-ROOMS.

SIR,—Perhaps you or some of your readers would kindly tell me where to put my hands on descriptive particulars of the best and most up-to-date methods of constructing and ventilating brick-built strong-rooms—say 9 ft. by 6 ft. by 12 ft. high—for the purpose of securing valuable documents, etc., against fire. AN ARCHITECT.



"INK-PHOTO" SPRAGUE & Co LTD 4 & 5, EAST HARDING STREET, FETTER LANE, E.C.

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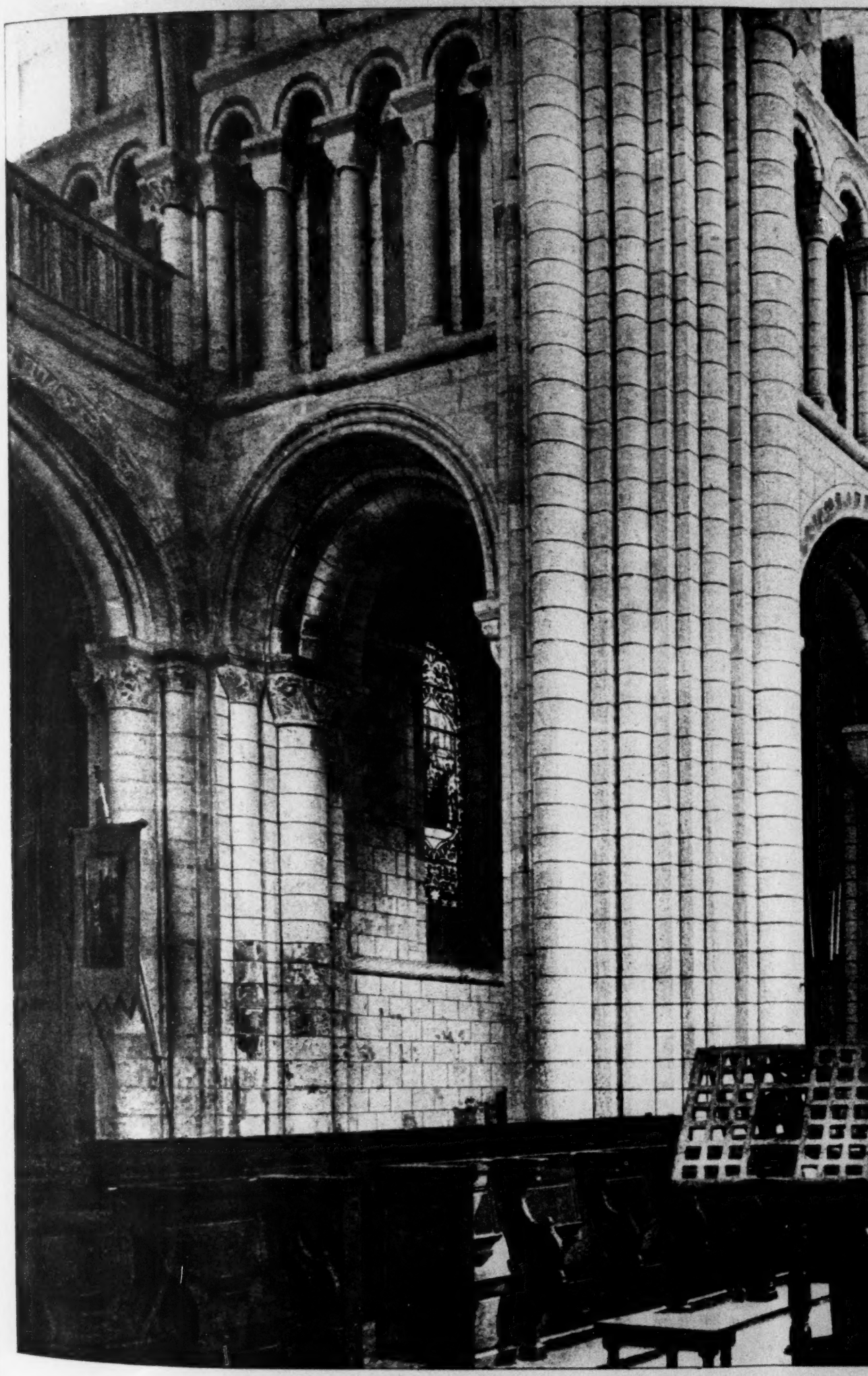

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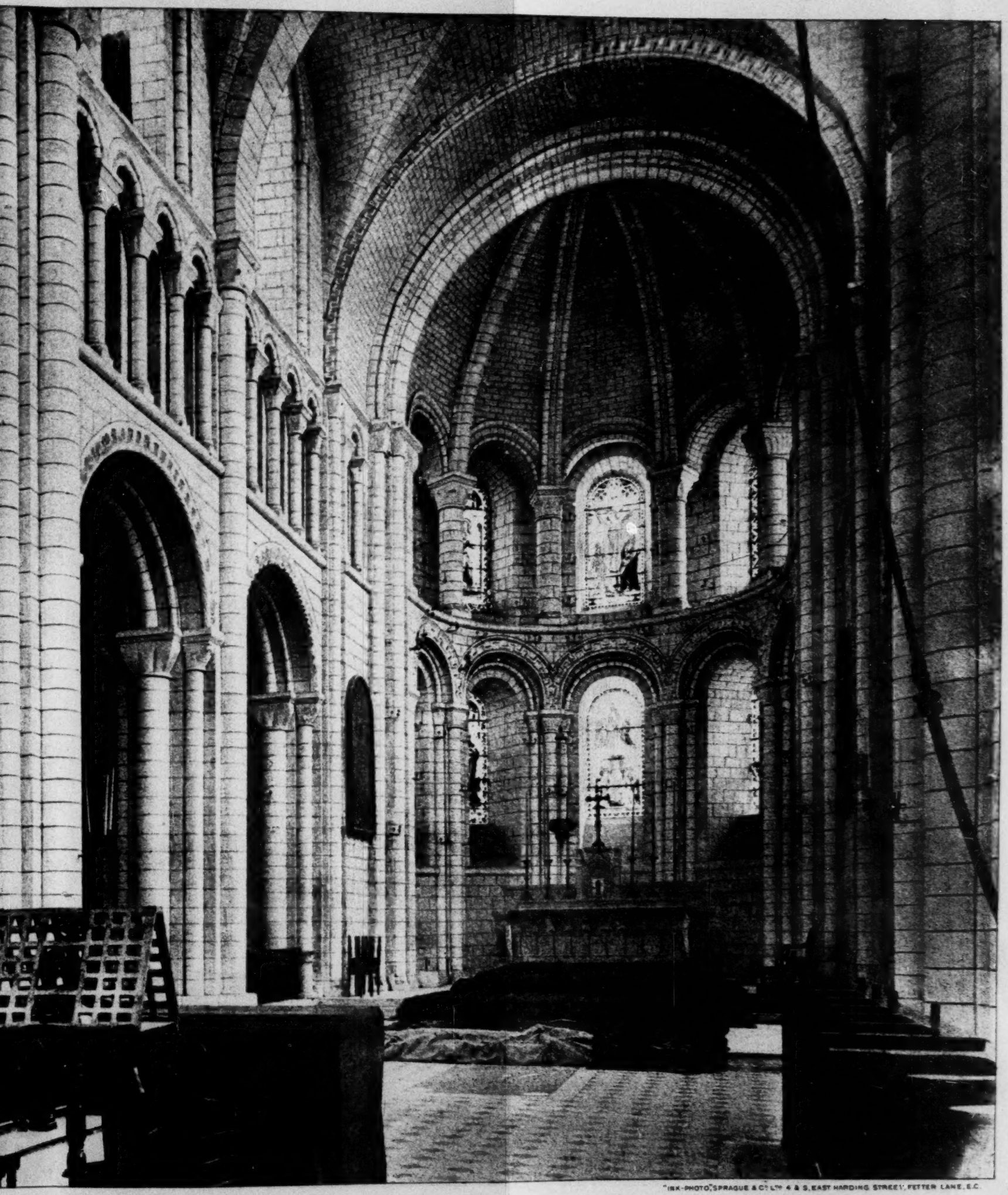

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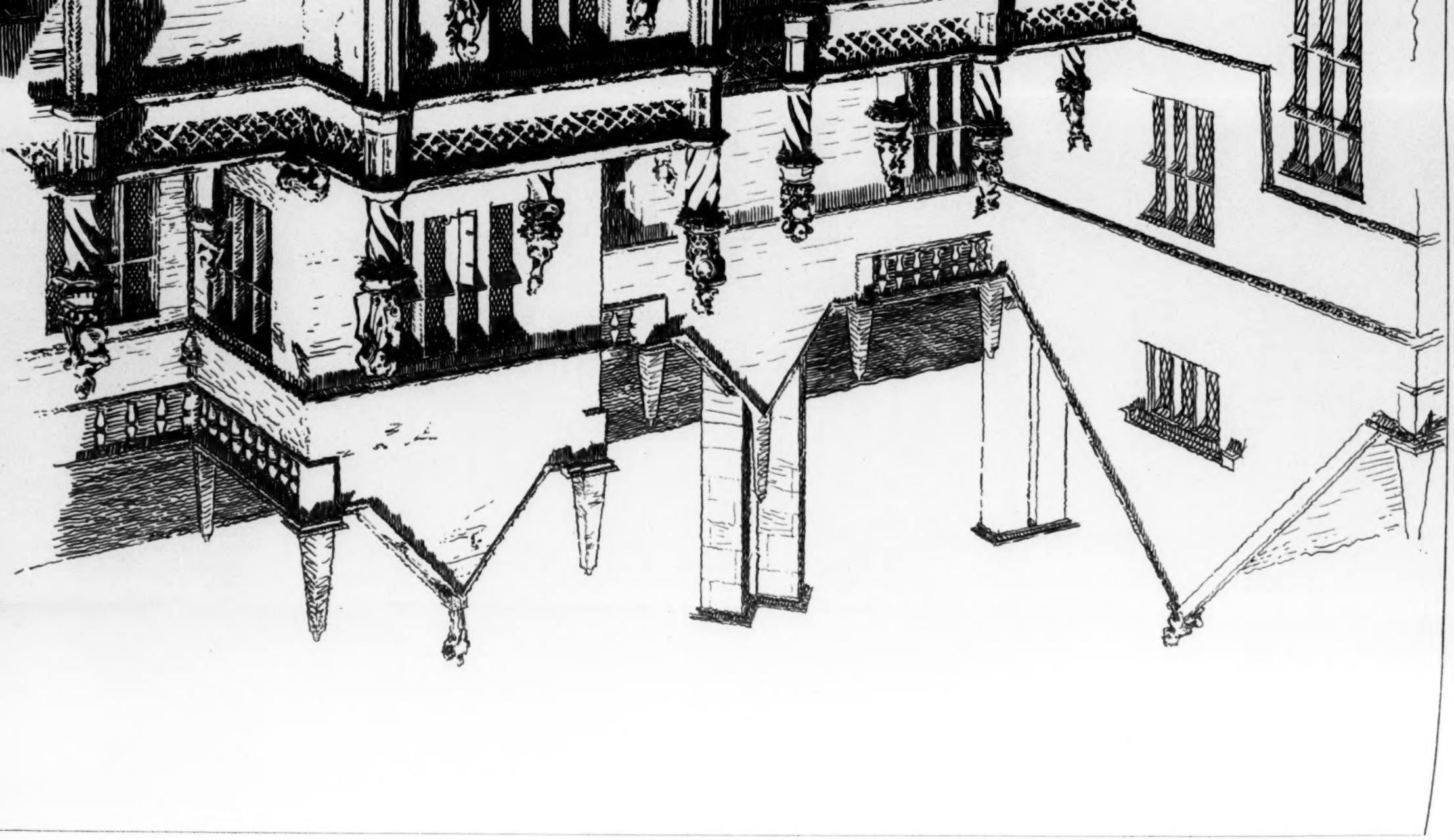

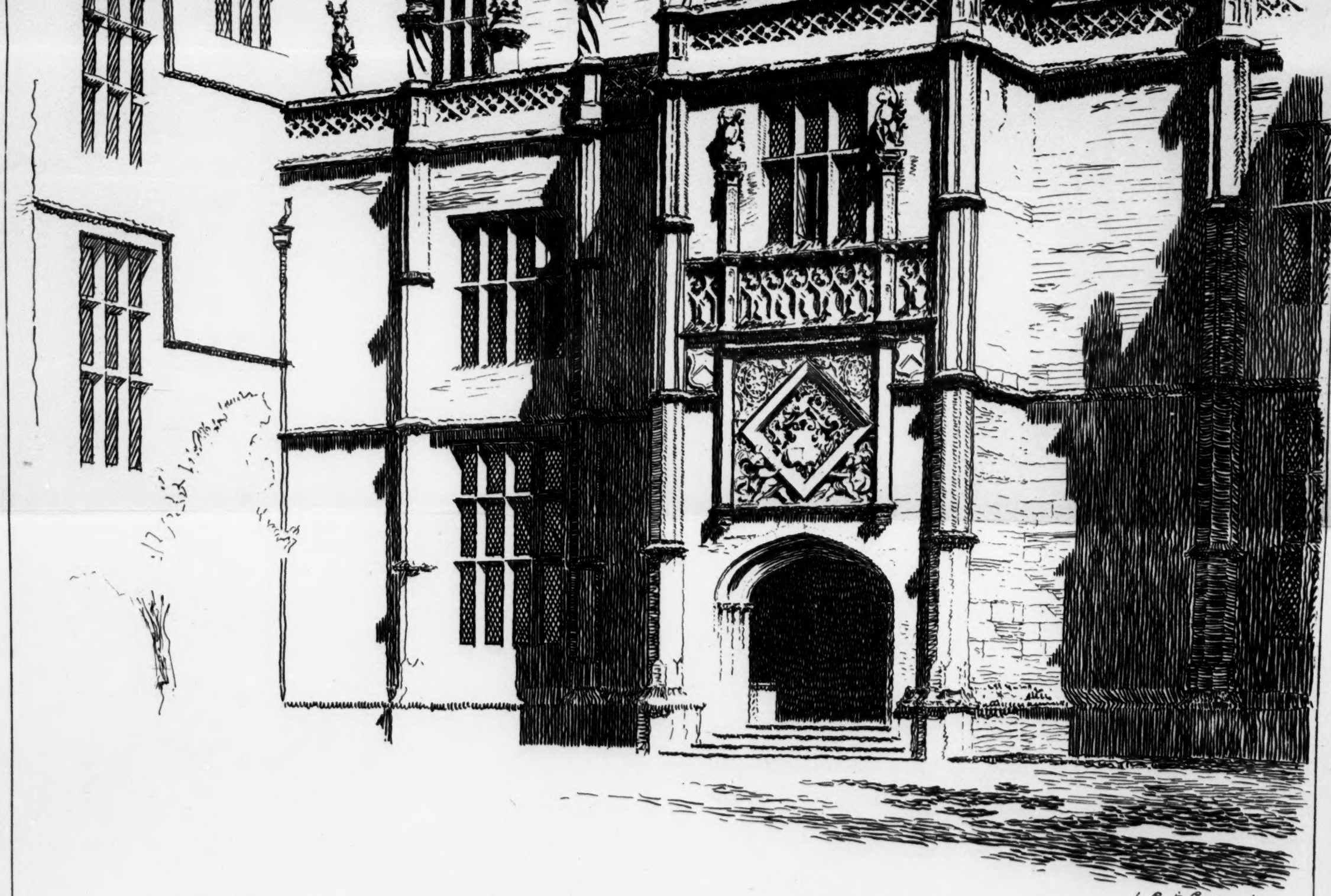

W. Curtis Green del
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MONTACVTE HOVSE, THE FRONT FROM CLIFTON MAYBANK

PHOTO-LITHO. SPRAGUE & Co. LTD. 4 & 5, EAST HARDING STREET, FETTER LANE, E.C.

SKETCHES WITH THE ARCHITECTURAL ASSOCIATION EXCURSION.

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CLIFTON MAYBANK

PRESTON GRANGE

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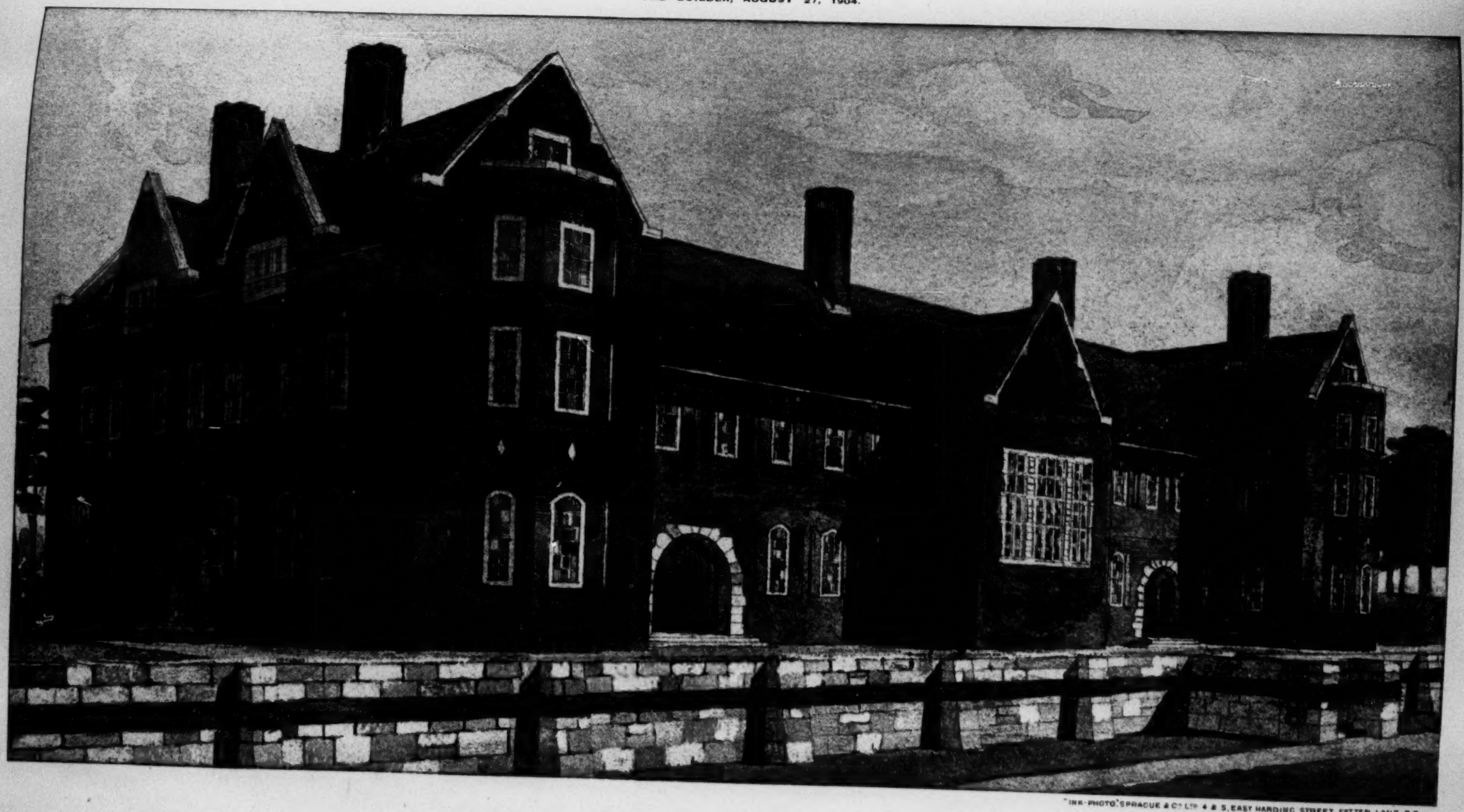
"INK-PHOTO" SPRAGUE & Co. LTD. 4 & 5, EAST HARDING STREET, FETTER LANE, E.C.

VIEW OF COUNTRY HOUSE: ENTRANCE FRONT.—Mr. Charles J. Bathurst, Architect.

THE BUILDER, AUGUST 27, 1904.



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VIEW OF COUNTRY HOUSE: GARDEN FRONT.—Mr. Charles J. Bathurst, Architect.

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THE CAMBRIAN ARCHÆOLOGICAL ASSOCIATION.

THIS Society held its annual meetings at Cardigan during the week ending the 20th inst., under the presidency of Mr. J. W. Willis-Bund, F.S.A. There was a large assembly of members and friends.

Cardigan Church, Priory, and Castle.

The first excursion was to the places of interest within the town of Cardigan. At a very early period there was established here a priory of Benedictines, a daughter house of the English abbey of Chertsey. It was founded by Rhys ap Gruffudd, a Welsh prince of considerable ability, and a great thorn in the side of Henry II., who conferred upon him the title of justiciar of South Wales. Rhys was the founder of the Premonstratensian house of Talley in Carmarthenshire, and the reviver and second founder of the Cistercian abbeys of Alba Landa (Whitland) and Strata Florida. Each of these foundations he endowed munificently, and it is clear that he not only entertained favourable opinions of the results of monkish discipline, but was desirous of obtaining the advantages that arise from free competition by giving all the popular orders of his day a chance of spreading their beneficent influence throughout the region subject to his hereditary rule. Rhys died in the year 1195. The priory of Cardigan was probably established by him shortly before his death. From the silence of Giraldus it may be inferred that it was not in existence in 1188, when Archbishop Baldwin and his suite crossed the Tivy at Cardigan, and Giraldus preached a crusading sermon with his usual effectiveness at the bridge head. But as the house was certainly founded by Prince Rhys, it may have been started in consequence of the Archbishop's visit, for Gerald, in enumerating the results that flowed from his discourse, states that it had been determined to commemorate the event by the erection of a "capella" "juxta caput pontis," and that many miracles had occurred therein. If the house was built upon the Cardiganshire side of the river it could not have stood exactly at the head of the bridge, this site being not quite suitable for a church requiring surrounding lands; moreover, the position was already occupied by a castle, so that the founders had to fix upon a situation upon the banks of the river a little further westward, and here, there can be little doubt, Rhys established his commemorative monument to the eloquence of Giraldus. But, whether that consisted only of a modest "capella," or whether the intent had expanded into the construction of a small monastic house, it is certain that not a fragment of it exists on the site of the present church. The only ancient portion of the latter is the chancel, and this is of the early part of the XVth century, though some of its details are of Late Decorated character. The chancel arch is, however, of the subsequent style, and gives the true date of the work. The east end was probably intended to be vaulted, for a century ago there remained in the chancel walls a number of corbels of which two only are at present *in situ* on either side of the chancel arch. One represents the face of a man, the other of a woman supposed to be the unfortunate Margaret of Anjou, probably in error. The east window is an early example of Perpendicular, of rather poor design. It was once filled with stained glass, of which only a few fragments remain in the topmost lights. In the south wall is an ogee-headed and pinnacled sedilia. A low door in the north side of the east wall gave access to the leads. The conventual buildings were to the south of the church, and extended almost to the river's brink. They were approached from the church by a depressed arched doorway now closed. A modern house called The Priory standing a few yards to the south-eastward of the church is supposed to be built upon the foundations of the priory buildings, and its cellars, being round-headed, were stated in a paper read upon the spot, to indicate that the priory was built before the year 1125. The house is, however, not in the line of the earlier buildings, though its lower portions were probably constructed at the time of the suppression of the monastery, and out of its ruins. Traces of buildings have been met with whenever work has been done on the south side of the church, and it was stated that on the enlargement of the garden of the modern house in a westerly direction four years ago, a solid road-bed 2 ft. deep was discovered. It is probable that excavations under the guidance of a trained ecclesiastical architect or antiquary would reveal the position and character of the chapter house and different domestic offices, and it is interesting to learn that the site of the cloister garth is still known to old Welsh residents as "yr hen ardd," the old garth. In the heyday of its fortunes the priory possessed a potent relic which brought much gain to the house, namely, a waxen taper, called Our Lady's taper, that never decreased in size or became extinct. An interesting document relating to this relic is printed in Wright's well-known "Suppression Letters," which states "that the image now situate in the church of Cardigan, which ys used for a greate pilgremage to this presente daye, was founde standinge apon the ryver of Tyve, and her sonne apon her lappe, and the same taper bernynge in her hande. The said ymage was caryed from thens into Christes church of Cardigan, and the sayd ymage wold not tarry there, but was founde thre or fowre tymes in the place where now ys buylded the church of our Lady, and the taper burnnynge in her hande, which contynued styll burnynge the space of nyne yeres, without wastinge, untill the tyme that one forsware hymselfe thereon, and then it extincted, and never burned after. That since the ceasinge of burnynge of the sayd taper, it was enclosed and taken for a greate relyque, and so worshipped and kyssed of pylgremes, and used of men to sweare by in difficill and harde matters, wherof the advauntage admounted to greate sommes of money in tymes passed, payenge yerely of the same xxti nobles for a pencion unto thabbot of Chersey." The church referred to as Christ's church is probably a chantry chapel which is known to have existed in the parish, but does not appear to have been within or annexed to the priory church. It survived the priory by a few years, but fell at the opening of the reign of Edward the Sixth. The priory itself seems to have reached a low ebb just before its suppression, for when Leland visited it, it contained but two monks, and its annual revenue according to the *Valor* was only 13*l.* 4*s.* 9*d.*

Of Cardigan Castle so little exists that it is difficult to form a satisfactory opinion of either its character or its date. It stood at a sharp bend of the river Tivy, and guarded the crossing, which must always have been effected at this spot by ford or bridge. It stands on a natural eminence, and as the key to the lower reaches of the river must always have been a place of importance from the earliest times; hence we read in the Welsh chronicles of constant conflicts for its possession, and so long as its defences were easily destructible, we have little chance of meeting with remains of its earlier existence. But when the Norman had effected a sufficiently permanent occupation to permit of the construction of a stout stone castle he was enabled to make good his position, and to build his defences in a manner that has, in some measure, defied the destructive agencies of time and gunpowder. The castle, of which the few remains still exist, was built in the XIIIth century, being probably the work of William Marshall, Earl of Pembroke, the great opponent of Llewelyn ap Iorwerth, Prince of Wales, who is historically known to have occupied Cardigan in 1240. The present ruins consist of two drum towers connected by a strong curtain wall. Speed's view shows the curtain continued around the sides of an irregular triangle, with the gatehouse at the eastern or shorter side, but most of these buildings have been removed to make room for a modern dwelling. There is, however, a portion of one of the gateway towers at the back of the house, and some of the cellarage is unquestionably the original basement, beneath which again is said to be a dungeon, now closed. The castle played a small part in the civil war of Charles I., after which it was almost entirely demolished. On one occasion the celebrated divine, Dr. Jeromy Taylor, was imprisoned here, and it is thought that he alludes to his detention at Cardigan in the preface to the "Liberty of Prophesying," where he says:—"In the great storm which dashed the vessel of the Church in pieces, I was cast on the coast of Wales, and in a little boat thought to have enjoyed that rest and quietness which in England I could not hope for." Papers on the antiquities of Cardigan were read—on the church by Mr. H. M. Vaughan, on the priory by Mrs. John Pritchard, and on the castle by Mr. S. G. Adams.

Mount Church.

This was unquestionably the most interesting of the parish churches seen during the meeting. Its situation is one of the most romantic that can be conceived, standing as it does at the foot of an isolated hill that rises to about 300 ft., and descends precipitously on its seaward side into the St. George's Channel. The nearest village lies far away, and the only habitations visible are a few scattered homesteads. At the foot of the Mount (so called *par excellence* from the singularity of its shape and position) is a tiny creek floored with exquisite sand, the very spot to strike the imagination of a British hermit; yet the name of no early Christian is associated with the parish. The church is dedicated to the Holy Cross, an invocation that is proof, first, of the near presence of a wayside cross of unusual local reverence; and secondly, of the complete loss of the name of the early Cymric saint with which it must have been associated in the earliest days of its history. The building consists only of nave and chancel without strutural division. The windows are modern insertions, but a fragment which can be detected on the external eastern face shows that the eastern gable was once occupied by a two-light Late Decorated window. There was also a single-light window at the eastern end of the south wall; this is now closed. The western gable is crowned by a rude bell cote. The roof, though it has been partially renewed, is still an interesting specimen of late XVth century timbering in an unusually good state of preservation considering the remoteness of the locality, the humidity of the atmosphere, and the severity of the western gales. The font is of very early date, having for its base what looks like part of the stem of a churchyard cross. The bowl is almost square, and large enough to admit of the immersion of an infant. The paten is pewter and of unusual shape. This parish was within modern memory the scene of a popular gathering on the first Sunday of the year. The inhabitants of the surrounding parishes were in the habit of meeting on that day to indulge in all manner of rough outdoor sports, held, it is alleged, in commemoration of a victory gained by the Welsh over the Flemings on this spot. In confirmation of the story a mound about 100 yards from the church is pointed out, which has yielded a quantity of human remains. Seeing, however, that the Mount itself bears clear traces of early circumvallation, and that animal bones are found intermixed with human in what is no doubt a prehistoric burial place, it is much more probable that the Mount was a Goidelic settlement, and that the gatherings alluded to were survivals of practices that are known to have been general in Wales in Elizabethan times. The story of the Flemings is probably due to a lively imagination working upon false etymologies, there being a Nant y Flyman, the Fy nan dingle, close by.

Penbryn Church.

Penbryn lies about three miles northward of The Mount, and is situated in almost as romantic and beautiful a spot. It has been restored. It consists as usual of nave and chancel only, which in this instance are not in line. The chancel arch is acutely pointed, and broken only by a shallow chamfered slab, which looks as though it was not occupying its first position. On the south side of the chancel is a sepulchral niche having a pointed arch. The interesting pewter alms-dish provoked some comment; the maker's name appeared to be Mowe, and its date 169-, the last figure being indistinct. A paper on the church was read by Mr. Pryse Williams.

Prehistoric.

On the rising ground above Penbryn church stands the Dyffryn Bern stone, the inscription upon which reads: "Corbalengi Iacit Ordous," the last word being regarded as connected with the tribal name of the Ordovices. Of Castell Nadolig, a camp of Romano-British character, where a Late-Celtic bronze spoon, now in the Ashmolean Museum was found, but little could be made in the time, though the fact that in this parish has also been discovered a coin (figured in Gough's Camden) of the regular British type based on the gold stater of Philip of Macedon, would seem to make a thorough examination of the ground desirable. Justice was also not done to The Gaer, a fine earthwork, where a *motte* of precisely the type which is being ascribed to Norman castle builders is associated with an inner and an outer enclosure.

Presidential Address.

In the evening the members of the Association were treated to a formal reception by the Mayor

and Corporation of Cardigan at the Guildhall of the town. After the social function Mr. J. W. Willis Bund delivered his presidential address, which was mainly concerned with the ethnological and cognate problems presented by the early history of South Cardiganshire. The discourse was exceedingly able and original, and bristled with new and debatable points which are likely to give rise to much discussion when the discourse is published in its entirety. The word "Llan" is well known to enter into the composition of a large number of the names of the parishes of Wales, and has always been taken as equivalent to the word "church"; thus "Llanfair" is always Englished as "the Church of St. Mary." Mr. Bund contended that this was a late usage, the original signification being that of fort or military camp, which forts were the work of invaders from Ireland. St. David, instead of being a Brython of the noble stock of Cunedda, was said to be a Goidel, and the member of a tribe which, in 500 A.D., still practised polyandryl With a view to settling the many ethnologica. difficulties that Wales presented, he called upon the Cambrian Archæological Association to undertake the preparation of lists of the prehistoric forts and tumuli of Cardiganshire.

Second Day.—Nevern Church, Crosses and Castle.

Nevern is well known to antiquaries for the great cross, known as the Cross of St. Brynach, which stands within its churchyard. It has also become known to the profane vulgar since its arrival at the lowest depth of pictorial degradation, namely, of representation upon halfpenny picture postcards. It is admirably illustrated in *Archæologia Cambrensis* for 1860. There is a puzzling inscription in minuscule letters on the front of the cross. The church has been restored. It consists of a western tower, nave and chancel, the latter being too large for the former. The lower portion of the tower is original, but the upper stages have been modernised, and an ineffective west window, consisting of four short round-headed lights, has taken the place of perhaps an early English lancet. A doorway of that period, unquestionably original, is placed on the north side. The font is modern. On the eastern side of the chancel arch are two transeptal chapels, one on each side of the church; and, probably in imitation of this feature, two similar chapels have been thrown out on the western side of the arch. The easternmost chapel on the south side, known as the Warren chapel, was probably erected late in the XIIIth century. It has a priest's chamber lit by a beautiful quatrefoil of this date in its eastern gable, but the chapel beneath was vaulted with rather coarse work during the Perpendicular period. A low doorway in the south-western corner of the chapel leads to the chamber above, and this stairway was the scene of one of the most interesting finds of recent years in Wales. It should be observed that in addition to the great cross of St. Brynach already mentioned the churchyard of Nevern contains a stone bearing an inscription in Latin and Ogam, the ancient Goidelic script. There is also known to have been within the church yet a third stone inscribed with the word "Johannis," but this has disappeared. In examining the steps just referred to, it was noticed by the Ven. Archdeacon of Montgomery that one of the stones above his head bore upon its exposed face a peculiar form of twisted ornament. Later, he drew the attention of Mr. Romilly Allen to this, and upon Mr. Allen going to look for the stone he mistook the one to which he had been directed, and set about examining the uncovered face of the stone lying next to that of which he was in search. He at once perceived the presence of Ogam marks upon the exposed angle, and thus discovered a fresh inscription. The Ogam lettering reads ECUNANMA, the last two characters no doubt standing for the word MAQUI, that is, "Ecunan, the son of——" It is of course impossible to say whether the marks are continued round the other angle, as is frequently the case, or whether there is not also an inscription in Roman letters on one of the other faces of the stone. It is, moreover, by no means certain that the neighbouring supporter with the peculiar incised ornament may not prove to be the lost "Johannis" stone. A good paper on the church was read by the Rev. Isaac Morgan, vicar of Eglwyswrw. A short distance from the church is a plain, equal-armed cross cut into the living rock, with a natural ledge below on which devout travellers knelt; and upon an adjacent height are the remains of a small castle, which has been so thoroughly dismantled that it is impossible to dogmatise upon its age or extent.

Newport (Pem.) Church and Castle.

This little town arose upon the building of a strong castle on the slope of the neighbouring hill by a descendant of Martin de Turribus. It became the head of the marcher lordship of Kemmes, carved out by the valour of that warrior, and the privilege of naming its mayor, which its founder reserved to himself, continues to be exercised by Sir Marteine Lloyd, Bart., the present representative of its marcher lord. The ancient Welsh name of the town is Trefdraeth, the township of the strand, in allusion to the splendid sweep of open beach which spreads away on either side; but to its Norman founder it was a "new port," or burgh, in contradistinction to the vill, probably Nevern, from which he had removed the headship of his barony. The ruins of the present castle are those of a building of the first half of the XIIIth century, placed on a levelled spur of the hill, where a small stream could be utilised for the purposes of the moat. The main entrance faced the north, and a strong curtain ran along in a westerly direction to a tower at the north-west angle. Thence it was continued to the south-westernmost corner, where was another tower of which hardly any masonry remains, and still further to a tower rising from a square base at the south-eastern corner. Here the ground slopes abruptly to the little stream before mentioned. It is now impossible to say how the supply of water to the moat was controlled, or whether there was any means of communication with the opposite bank on this side of the castle. The south-eastern tower probably contained the residential apartments, which has preserved its distinctive features to a greater extent than any other part of the building, though it would be difficult, if not impossible, without some excavation to determine their different uses. A basement chamber the groined roof of which is supported by a central pillar of Late Decorated character, is popularly spoken of as the dungeon, but is more likely to have been the cellar. The gateway has been incorporated into a modern house, which has been built against it to face the courtyard, now a charming grassy lawn, and this part of the castle was accordingly not inspected.

The church has been thoroughly and effectively restored, so that the only feature of ancient date still remaining is the fine western tower. The buttresses are good examples of the regular Perpendicular type, dying off into the tower face just beneath a very striking corbel table which carries a deep and imposing battlement. In the south-western buttress immediately below the second weathering is an unoccupied niche, and at the same distance below the third slope is a female head. There is a good deal of heraldry about the tower which no member of the party could interpret. About half-way up the western face are two shields each bearing a chevron and perhaps some other charge, while the label around the western door is terminated with shields showing a chevron, and the outer members of the door mouldings are also finished off at the ground level in the same manner. The lowest stage of the tower has a slight batter. The tower stairs are carried up in a square projection on the north side, and are lighted by slits and, at the second opening, by a quatrefoil. Internally there is little of interest beyond the font, which is a good example of the massive Norman fonts that seem to have been general throughout the district. The chalice is dated 1574, and is of good pattern. The tower opens into the nave with an acutely pointed arch, as in the case of Nevern, and in the space under the tower is a fine sepulchral slab of the early part of the XIVth century. On its upper part is the head of a young female wearing a wimple brought tightly beneath the chin, and a plain band across the forehead. Below is a floriated cross of great beauty and finish. The inscription running round two sides of the slab is as follows:—"+ Ces: ane: git: ici: dev: del: alme: eit: mercie." The first two words, of the reading of which there can be no question, have always been a puzzle to antiquaries, and all kinds of manifestly inadequate suggestions have been offered of their meaning. The writer of the present notice begs to offer another, which does not at any rate violate probability. It is that they stand for the modern "Ceans aine": "Within here lies the eldest: God have mercy upon her soul." The person commemorated was probably the senior of several sisters, and the heraldic emblems upon the exterior of the tower were doubtless considered sufficient to point to her family and lineage without the necessity of a more personal designation. The Rev. Isaac Morgan read a paper upon the church.

Prehistoric.

The next visit was to the Pentre Evan cromlech, the largest example of this form of sepulchral monument in the kingdom. Sir Henry Howarth made some interesting remarks upon the subject of early burials. This is the only ancient object in Wales that has been scheduled by the Board of Works under the Ancient Monuments Act. As an instance of the silent but unceasing work of nature, it may be observed that a member of the Association who was present stated that she had visited the cromlech over half a century ago, and though mounted on a horse fifteen hands high she was then not able to touch the capstone with her hunting crop, whereas now she could do so on foot with a walking-stick. At the neighbouring farmhouse of Pentre Evan is a building, now a barn and stable, which contains some rudely splayed windows and an early, probably original, roof. It is apparently of the time of Henry VII.

After luncheon an arduous climb was undertaken to the summit of Carn Ingli, a height of about 1,250 ft., on the upper slopes of which is an enormous camp of the same character as Tre'r Ceiri, in Carnarvonshire. The latter has been the scene of excavations by the Rev. S. Baring-Gould and Mr. R. Barnard, the former of whom read a paper at the Portmadoc meeting of the Association. The conclusions of the excavators, namely, that Tre'r Ceiri was probably constructed in the first century of the Christian era, was stoutly contested upon that occasion, so that the visit to North Pembrokeshire was looked forward to with interest, as several of the principal heights of the Precelly range are crowned with stone camps of similar construction to, and almost as large in area as, the Carnarvonshire example. Carn Ingli is a splendid example of its class, and astonished the visitors by its extent, its strength, and the complexity of its arrangements. The upper slopes of the hill are strewn with enormous masses of stone and of ruined hut circles. The cursory examination which the party could give to this splendid prehistoric fortress cannot be said to have advanced the stock of knowledge relating to its age and builders, but its extreme rudeness renders the belief difficult that it was erected during the period of the Roman occupation, or that that great people would have permitted its construction. Of recorded history it has none. The party next drove to Lwyngwair, where Mr. J. B. Bowen entertained them to tea.

Thursday.—St. Dogmael's Abbey.

The little village of St. Dogmael's (*Wallicè*, Llandudoch) lies on the Pembrokeshire side of the Tivy, about five miles from the embouchure of the river. It thus fell within the lordship of Kemmes which the strong arm of Martin of Tours won from the Welsh in the first half of the XIIth century. Following the prevailing custom of the early Norman leaders, he established a religious house at St. Dogmael's, or, it may be, enlarged and enriched an existing British foundation. His new monastic settlement he annexed to the Benedictine abbey of Tiron, in France, and he and his son endowed it liberally with lands. The earliest charters of the house have been published by Mr. Round. The buildings, now above ground though mere fragments, are clearly of different dates. A roofless edifice, the first at which the visitor arrives, has been termed a refectory by Fenton, the historian of Pembrokeshire, but careful scrutiny will show it to be of much earlier date than the other portions of the ruins. It is without doubt part of the original Norman church, though it has lost almost all clues to its identification. Its most interesting feature is the remains of its stone roof, which was carried upwards in a graceful curve. This building runs east and west, and measures about 40 ft. by 20 ft. The height to the apex of the roof is about 30 ft. It is now a fowl run, and has been considerably knocked about in its long and sad career of degradation down the ages. A orifice in the south wall, now closed, appears to have originally been of the early Pointed style, as is also the west door. A small niche on the

same side probably marks the position of the piscina, and it is not perhaps entirely fancy that sees signs of the drain in a partly broken stone. The building is buttressed, but these have been so altered, or are so hidden by ivy, that it is impossible to make out their original character. The masonry externally is extremely good, an excellent effect being obtained by courses of large flat stones of a different colour to the ordinary rubble. No trace of any conventual buildings of the same period as this church is visible, nor is there any indication in the ground around of the direction in which they would have to be sought. About two centuries later than the construction of this edifice the convent must have found itself in flourishing circumstances, for a totally fresh establishment was built a few yards north-westward of the first church. The plan of the new foundation can be made out with fair success, for the ruins consist of the west front, and north wall and transept of the priory church. Fifty years ago there would seem to have been clear indications of the eastern end, but the full extent of the church in this direction is now only a matter of conjecture. The west window, which was of great size, has lost every vestige of tracery. The north transept was altered at a later period, and probably transformed into a mortuary chapel; the lower portion of a beautiful fan-traceried roof still springs from a fine corbel. This transept is somewhat too shallow in proportion to the length of the nave. It contains two recesses for tombs. Of the conventual buildings none have survived, save a fragment of walling at the south-east corner of the cloister contiguous to the original church. The latter was probably retained as the parochial church, but it does not appear ever to have been structurally connected with the later edifice. It is much to be desired that researches into the documentary history of St. Dogmael's priory should be undertaken, and in particular that the first account of the priory's revenues compiled after its dissolution should be transcribed, as it would probably throw much light upon points that are at present not susceptible of explanation. The President of the Association drew attention to the far too luxuriant growth of ivy over the western end of the later church, and suggested that it should be judiciously pruned. Within the priory grounds stands an ancient stone having inscriptions in Latin and Ogam commemorative of one Sagramnus, the son of Cunotamus. Other slabs bearing crosses of early form are scattered around, and the altar stone stands upright, half buried in the ground. The remains of what must have been a splendid canopied tomb have been formed into a sort of rockery in front of the adjoining house.

New Castle Enlyn.

A small military work most probably occupied from very early times the tiny peninsula created at this spot by an extremely sharp bend of the Teify, where are now the remains of a military gateway of the period of Henry VII. Every other part of the castle has been reduced to shapeless grass-hidden masses, though the conformation of the ground easily admits of its reconstruction. The peninsula is roughly triangular in shape, having the river protecting the two longer sides. The shorter or landward side was defended by a deep moat, fed from both arms of the river and thus transforming the peninsula into an island. There were probably outer defences where the ground fell away to the level, but these have left not a wrack behind. The masonry of the gateway towers is poor and late, and is without doubt the work of Sir Rhys ap Thomas, the knight to whom the success of Bosworth Field was largely due. The castle was one of the seats of the unfortunate Sir Rhys ap Gruffudd, the grandson of Sir Rhys ap Thomas, and certain disturbances that occurred here in the early part of Henry VIII.'s reign helped to bring the young knight to the scaffold. A somewhat inadequate paper on its history was read within the courtyard of the castle by Mr. J. C. Roberts, but its architectural features were not alluded to, nor any effort made to recall its ancient renown. Sir Henry Howarth, however, after a few general remarks upon military architecture, initiated a very interesting discussion on the question of the date and constructors of the moated mounds which are found all over the country, and which were attributed to the Anglo-Saxons by the late Mr. G. T. Clark. This view has recently been attacked with much ability and learning by Mrs. Armitage in the *English Historical Review* and other journals, and by Mr. J. H. Round, the contention being that all such mounds are Norman in construction, and consequently of later date than 1066. Mr. Edward Owen being called upon for a few remarks, observed that while unable to speak of the applicability of Mrs. Armitage's conclusions to English *mottes*, he found considerable difficulty in accepting them as true of the moated mounds of Wales. Even if the English examples were ultimately proved to be pre-Norman in date, it was quite clear that they must be placed towards the end of the period; and, regard being had to the influence of Norman manners upon the court of Edward the Confessor, and to the imperative necessity that faced the Norman barons directly after Hastings of securing their possessions as rapidly as possible, it was not merely likely, but highly probable, that the undoubted advantages of a residence upon a *motte*, whether crowned by wooden or by stone defences, would out of the sheer necessity of the situation lead to their construction. He was therefore unable to meet Mrs. Armitage's argument so far as it was based upon the *mottes* of England. But difficulties at once arose when the theory was applied to Wales. Scattered up and down the Principality are artificial mounds surrounded with deep moats, in some instances filled with water at the present day. Some of these, such as the splendid example which has given its name to Moat Lane, have never borne a stone tower, though they were doubtless defended by stout wooden barricading. Others like Brynllys, on the English border, have a more or less perfect stone keep. The point was that many of these mounds are found in places where it can be historically demonstrated a Norman baron had never penetrated to. It was possible that at Rhuddlan and at Cardiff the mound and tower were both Norman, because it could not be denied that the Normans had reached those places before the close of the XIth century, and that the exigencies of their dangerous situation would call upon them to adapt existing defensive works, or to construct new ones. But this could not be said of the precisely similar moated mound at Dolbenmaen, in Carnarvonhsire, visited by the Association last year, or of many other instances that could be adduced on ground that the Norman, *qua* Norman, had never trod. Until it could be shown, either that the Normans had been able to occupy for a sufficiently long period to construct the enormous moated mounds the sites of these erections in various parts of Welsh Wales, or that the Welsh had copied a form of defensive post which, it is admitted, was soon superseded by more elaborate stone structures, he was unable to regard Mrs. Armitage's views as affording the true explanation of the Welsh *mottes*; and if they did not apply to Wales there would seem to be grounds for doubting them altogether. Lieut.-Colonel W. L. Morgan, of Swansea, took the opposite view, arguing that there were differences between the *mottes* of England and the moated mounds to which Mr. Owen had referred; but he did not enter into details of the dissimilarities upon which he insisted.

Cenarth Church.

This church, which is situated in the county of Carmarthen, is practically new, and, judged as such, is a charming example of a modest country church. The only relic of a bygone age is the font. In size it differs from the square and massive Norman fonts, of which many are still in use in the district, and for this reason several of the visitors were inclined to consider it to have originally been a free standing benitier or stoup. It is ornamented with five heads, arranged at four equal distanced spaces, there being accordingly two heads in one space. The spaces are connected by a cord, which droops into a curve between each facet. The churchyard contains a famous Ogam stone, which at one time stood over the grave of the favourite charger of a neighbouring squire, and at a still earlier period seems to have occupied a site called Temple Druid in a far away Pembrokeshire parish. How it found its way across the Precelly hills, to find an honoured home within the confines of Carmarthenshire, has provoked the curiosity of Professor Rhys, but found no explanation from the assembled antiquaries. After tea upon the lawn, the valuable collection of coins, manuscripts, and early printed books, for which Cenarth Vicarage is celebrated throughout Wales, was examined. Just below the church the Tivy flows noisily over rocks that attempt to bar its course, and is spanned by an interesting bridge. A few cottages are grouped around the bridge end, one of which, by reason of its possession of a good oaken roof with trefoiled openings between the timbers, may possibly have been a tiny chapel and dwelling of the guardian of the bridge.

Cilgerran Castle and Church.

The strategical value of the river Tivy to the Norman invaders of the district is shown by the line of castles constructed by them at favourable spots along its banks, of which those of Cardigan and Newcastle Emlyn had already been visited by the antiquaries. The most important, however, both from size and position, was that of Cilgerran, which, unfortunately, came in for inspection at the close of a long day. It stands on a tall cliff overlooking the river at this point it at its finest, and it gave to Turner one of his most glorious inspirations. Like the other castles which have been named, the plan of Cilgerran is adapted to the irregularities of the site, and balance of parts or symmetry of design is, therefore, not to be looked for. But the admirable manner in which the position has been utilised makes this an interesting example of a pre-Edwardian castle, and its details call for thorough and careful study. One feature in which the baronial castles of the Principality differ from the great achievements of the first Edward is the much more restricted area of their outer defences. All the great Edwardian fortresses of North Wales were carefully planned with the view of defending the towns over which they threw a protecting eye, and the manner in which the town defences were arranged as an integral part of the general plan of the different castles is, in each case, of great interest, not alone to the student of military architecture, but to him who regards only the care with which these nascent municipalities were fostered and protected. Cilgerran castle was not planned to guard a tiny town. What was outside its moat was of little concern to the fierce noble whose chief purpose was to provide himself with the best defence he could construct against his enemies, and who allowed such of his followers as lived without its walls to fare as best they could in the day of trouble. There is an excellent description of the castle by Mr. Clark in the 1859 volume of "Archæologia Cambrensis," which has not been reproduced in his well-known book, and it must suffice on this occasion to draw attention to that account, as enough time was not given for the mastery of the peculiarities that the irregular plan of the building occasioned.

Cilgerran church is yet another instance of the drastic restorations to which most of the edifices of the district have been subjected within the past half century. It consists of a nave with south aisle, chancel and western tower. The latter, which is for the most part original, is of the regular South Cardiganshire and North Pembrokeshire type. This church, however, possesses a western door of good, though plain, Early English character. The churchyard contains a Latin and Ogam inscribed stone.

Friday—Bridell Church.

There was nothing in this practically modern and uninteresting edifice to delay the party; but an ogam stone, of which every churchyard of this neighbourhood seems to possess a specimen, was examined and dilated upon.

Moel Trigarn, &c.

This was the *pièce de resistance* of the day's programme. It is a large stone camp of the character of Carn Ingli, seen on the preceding Wednesday, stationed on an eminence of the Precelly Hills. The summit of the hill, which is 1,200 ft. above sea level, is crowned by three stone cairns, which has given the height its distinctive appellation. The mountain is clothed to its crown with coarse grass, and it is thus relieved of the stern and barren aspect of its neighbour, Carn Ingli, and of its congener, the Carnarvonshire Tre'r Ceiri. In design it does not differ from those camps, but some of its details are peculiar to itself. A discussion arose on its probable age; but notwithstanding that both Mr. Edward Laws and Colonel W. L. Morgan agreed that it was of the Late Celtic period, they differed much on the question whether it fell early or late in that period. Many of the hut circles have been excavated by Mr. Baring Gould, and a full account of the objects then unearthed, accompanied by good illustrations of the camp, is given in "Archæologia Cambrensis" for July, 1900.

The party next drove to Clydai church, where are no less than three inscribed stones. At Capel Colman the programme was exhausted

by an examination of Maen Colman, a monolith bearing a rude cross within a circle, and on the reverse side another cross of different form.

At the evening meeting on Thursday an interesting and valuable address was given by Mr. W. Riley, of Bridgend, on the results of excavations undertaken by him into prehistoric mounds scattered over the low-lying land around the mouth of the river Ogmore in Glamorganshire. The human and other remains, mainly of the Early Neolithic period, which had been disinterred by Mr. Riley, were brought by him for exhibition to the antiquaries at Cardigan, and Mr. Riley's discourse was followed by a very able demonstration by Professor Hepburn, of the Cardiff University College, of the cranial and anatomical peculiarities of Neolithic man, as evidenced by the skeleton then produced. This example showed a man of brachycephalic skull, having great brain capacity and physical power. In the tumuli which he had opened Mr. Riley found quantities of the objects usually associated with Neolithic dwellings, together with one or two fresh forms that were unknown to so experienced a pre'istoric archæologist as Mr. Edward Laws, F.S.A., of Tenby. In several instances the mounds contained secondary interments, apparently of the later Neolithic period, and the neighbourhood also yields relics of the Bronze and Early Iron ages.

Another paper by Professor Anwyl of the Aberystwyth University College, dealt with the "Early Settlers of Cardiganshire." It was an able and careful *résumé* of the sum of modern knowledge upon the question, but it contained none of the suggestive, if risky, conclusions of Mr. Willis Bund's presidential address.

On Friday evening the usual complimentary votes were passed, the most deserved being to the honorary local secretary, the Rev. D. H. Davies, Vicar of Verwig, who had been indefatigable throughout the meeting in attending to the comfort of the visitors. Shrewsbury was selected as the rendezvous for 1905.

BOOKS RECEIVED.

EUROPEAN AND JAPANESE GARDENS. Papers read before the American Institute of Architects by A. D. F. Hamlin (Italian Gardens); R. Clifton Sturgis (English Gardens); J. G. Howard (French Gardens); and K. Honda (Japanese Gardens). Edited by Glenn Brown. (Philadelphia: H. T. Coates and Co. 1902.)

BRITISH STANDARD SPECIFICATION FOR TUBULAR TRAMWAY POLES. Issued by the Engineering Standards Committee. (London: Crosby Lockwood and Sons. 5s. net.)

BRITISH STANDARD TABLES OF COPPER CONDUCTORS AND THICKNESSES OF DIELECTRIC. Issued by the Engineering Standards Committee. (London: Crosby Lockwood and Sons. 2s. 6d. net.)

THE TIMBERS OF COMMERCE AND THEIR IDENTIFICATION. Illustrated. By Herbert Stone, F.L.S., F.R.C.I. (London: W. Rider and Son, Ltd., Aldersgate-street, E.C.)

MINEHEAD, PORLOCK, AND DUNSTER. Second Edition. The Homeland Handbooks Series. (Minehead: Cox, Sons, and Co., Ltd.; London: The Homelands Association, Ltd. 6d. net.)

HANDBOOK OF STATIONS, including Junctions, Sidings, Collieries, Works, etc., on the Railways in the United Kingdom. (London: The Railway Clearing House, Seymour-street, Euston-square, N.W. Price 8s.)

FERRIC AND HELIOGRAPHIC PROCESSES; a Handbook for Photographers, Draughtsmen, and Sun-Printers. Second Edition. (Published for the Photogram, Ltd., by Dawbarn and Ward, Ltd. 2s. net.)

THE CONSTITUTION OF PORTLAND CEMENT FROM A PHYSICO-CHEMICAL STANDPOINT. By Clifford Richardson. (New York: Research Division, Testing Laboratory, Long Island City, N.Y.)

APPOINTMENT.—A meeting of the Samford Rural District Council was held at the Board Room, Tattingstone, recently, when the Clerk, Mr. Arnold J. Haward, read the report of the committee appointed to consider the subject of the appointment of a building surveyor. The committee reported to the effect that Mr. Henry J. Wright, the Sanitary Inspector to the Council, should be appointed to the office. After discussion this was agreed to.

The Student's Column.

NOTES ON PORTLAND CEMENT.

CHAPTER VI.—FINENESS.

PROBABLY one of the first tests to which cement is subjected is that for fineness of grinding. The manufacturer in passing through his mill, or the user on receiving a fresh consignment, will, almost unconsciously, pick up a pinch and rub it between his fingers to test its fineness.

The demand for finer ground cement is on the increase, a few years ago 10 per cent. residue on a sieve of 2,500 meshes per sq. in. being the general rule; now 5 per cent. on a sieve of 10,000 meshes is not uncommon.

Still, the value of fine grinding does not appear to be appreciated by users generally. Cases have been known where builders have pronounced a cement over-ground.

Nothing could be more absurd. A cement cannot be too finely ground, as the larger the percentage of flour, the greater its capacity for carrying mortar; that is, concrete as strong may be made with half the quantity of a finely-ground cement that would be necessary of a coarsely-ground one. This fact is not appreciated by all builders, the same quantity of cement being used in mortar regardless of the fineness.

A cement having a residue of, say, 10 per cent. on a 50 sieve will show an increase of 20 per cent. in tensile strength if ground fine enough to all pass through this sieve; but it is in sand tests that the increase in value due to fine grinding is seen. As each particle of sand requires to be covered with a thin coating of cement, the more finely ground the latter is, the thicker the cementitious coating and, therefore, the stronger the mortar will be bound together.

It is generally believed that the coarse particles in cement have no cementitious value, but this is not the case. The author has made small blocks of the particles held by a 76 sieve, which after being in water used for storing briquettes some months have attained considerable hardness. This was thought to be probably due to the deposition of hydrate of lime from the briquettes in the pores of the blocks; but experiments carried out by Mr. D. B. Butler conclusively prove that the coarse particles have in themselves some cementitious value.

Mr. Butler separated the coarse particles into three degrees of coarseness, and, to make certain that no fine cement dust was held by the particles, they were washed thoroughly by decantation till the washing water was clear. The coarse particles thus prepared were made into briquettes, which were broken after being six and twelve months in water. The results are shown in Table I.

TABLE I.

Size of Particles.	Held by a 50 × 50 Sieve.		Passed 50 × 50. Held by 70 × 70.		Passed 70 × 70. Held by 120 × 120.	
Age of Test.	6 Months.	12 Months.	6 Months.	12 Months.	6 Months.	12 Months.
Sample A	150	160	200	200	250	330
„ B	95	120	110	160	175	200
„ C	90	120	110	170	190	280
„ D	90	140	115	197	192	300
„ E	—	180	190	292	350	420

Having proved that the coarse particles had some cementitious value, various samples were procured to try the effect of fine grinding and the presence of the coarser particles had on the strength of the cement. Tensile tests were made of each sample—first, in original state; second, ground very fine; third, coarse particles substituted by sand of similar size.

The effect of the fine grinding was greatly to increase the cementitious value, as seen by the sand tests. The neat tests in some cases gave higher results for tensile strain after seven days, but not increasing much thereafter, and in others the tensile strain after seven days was not so good as that of the original samples. An explanation of this might be found in the fact that the fine grinding made the samples so quick-setting that time could not be allowed to make the briquettes properly, and a large excess of water was required in gauging. In each case the substitution of sand for the coarse particles gave lower tensile strains than the original samples did.

Mr. Butler's experiments prove—

(1) That the coarse particles of cement are not inert, but have a certain value according to their size.

(2) That fine grinding of cement reduces its cohesive power, but greatly increases its adhesive power.

An instance of the cementitious value of the coarse particles in cement was brought forward by Mr. G. L. Anderson in the course of a discussion on a paper read before the Society of Engineers.

Mr. Anderson experimented with briquettes about a year old, made of cement which had been originally ground to a fineness of about 5 per cent. on a 50 sieve. He ground them up without recalcination or other treatment, so as to all pass a 76 sieve and leave a residue of 16 per cent. on a 180 sieve, and made briquettes of the resulting powder. The neat briquettes stood a tensile strain of 403 lb. per sq. in. after seven days, 415 lb. after twenty-eight days, and 435 lb. after three months. The sand tests gave strains of 224 lb. after twenty-eight days, and 300 lb. after three months.

Fine grinding greatly quickens the setting time of a cement. According to Le Chatelier's theory, the setting is due to super-saturation, so that, the more finely a cement is ground, the more readily it dissolves and the quicker the deposition of the crystals. The fineness of grinding should always be taken into account when judging the setting properties of a cement. The demand at the present time is for a fine cement, and at the same time a slow-setting one. These two characteristics are antagonistic, a finely-ground cement meaning a quick setting one, according to the degree of fineness, unless artificially rendered slow setting. This may be done by suitable aëration, and engineers and contractors should make allowance for this. The author has seen specifications in which it is stated that the cement shall be ground very fine, the setting time not to be less than three hours and the volatile matter not more than 1 per cent. This is almost an impossibility unless at great expense, or artificial means of slowing the setting is resorted to.

Fine grinding of a cement undoubtedly checks to a considerable extent the tendency to "blow." Unsoundness of a cement is caused by one of three faults in manufacture—viz., the coarse grinding of the raw material; over-liming or excess of lime; under-burning. In each case free or loosely-combined lime is the result. The first two are the most dangerous, as the free lime is enclosed in the hard-burned particles, and it may be months before their effect may be felt. Unsoundness from under-burning is easily overcome by aëration. The benefit of the fine grinding of the cement, therefore, is that the uncombined lime which would otherwise be in the coarse particles is easily overcome by aeration or is hydrated on gauging the cement with water, and is thus rendered harmless.

Of all the tests to which cement is subjected, that for fineness is probably one of the simplest and yet one which causes much friction between the manufacturer and the user. This is due to the want of uniformity in carrying out the test. A weighed quantity is sifted on a sieve having a certain number of holes per sq. in., and ascertaining the quantity which will not pass through. In England there is no recognised standard as to the thickness of wire of which the gauze of the sieves are composed, and then again there is no agreement as to the length of time the sifting should be continued. The thicker the wire, the smaller the holes, and, consequently, the greater the residue will be.

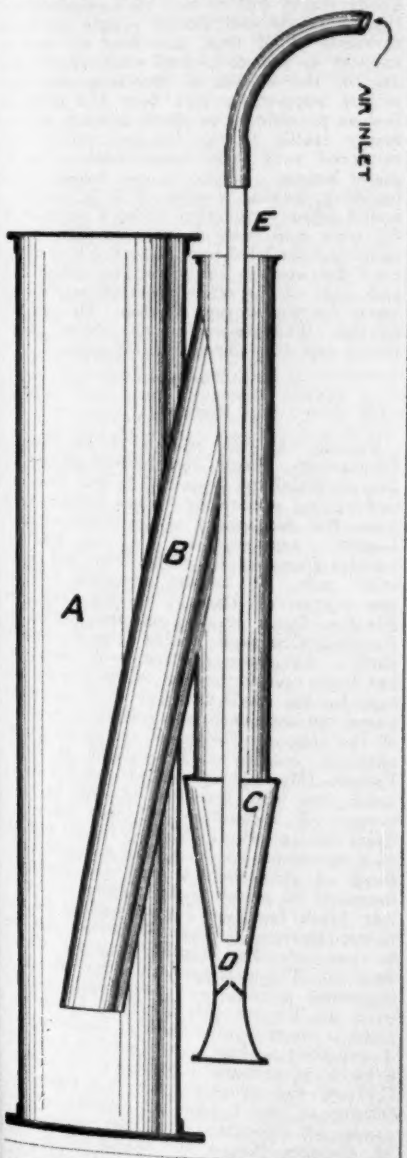
In America and on the Continent the standard adopted is that the thickness of the wire shall be one-half the size of the opening. In Table II.

will be seen the thickness of wire of various sieves and the size of the opening according to this standard.

TABLE II.

Number of Meshes per inch.	Thickness of Wire.	Width of Opening.
	Inch.	Inch.
180 x 180	·0018	·0037
120 x 120	·0028	·0055
100 x 100	·0032	·0067
76 x 76	·0044	·0087
50 x 50	·0068	·0132
40 x 40	·0084	·0167

The length of time during which sifting is performed has considerable effect on the results obtained, especially on the finer sieves. The author considers that no time limit can be given unless a standard method be employed. One operator using a sieve of, say, 6 in. diameter and sifting 100 grammes will take longer to get all the fine particles through than one using a sieve of, say, 10 in. diameter; then, again, two operators never sift alike; one may be quick in the movements of the sieve, another slow, and several other personal differences might be cited. The author considers



that the sifting should be continued till no appreciable quantity passes through the sieve. After this, prolonged sifting only grinds the particles one against the other and on the wire of the sieve so reducing some small enough to go through the holes.

When the fineness on various sieves is required the most suitable method is to sift the cement at once through a "nest" of the sieves—that is, one within the other, the sample being put into the coarsest sieve and passing down to the finest. Sieves having a cover should be used, as it is very easy when sifting in an open one to bounce some of the particles over the side. Where a number of siftings are done daily, a mechanically-driven sieve is very useful and gives good results, especially for the manufacturer to use as comparisons.

Sieves should be examined frequently to see that none of the wires are displaced or broken, thus giving larger apertures, and, again, the wires of sieves which have constant use get worn thin, larger apertures being the result; or, if the sieves are damp when used, the fine cement will stick to the wires and so clog the holes. If the cement is damp, it should be dried in an air-oven and any lumps broken by gentle rubbing or pressure; in fact, some operators recommend drying all samples before sifting.

Sifting a sample of cement to determine what residue is left on a standard sieve, and so judge of its fineness, is not quite satisfactory.

As the cementitious value depends on the amount of flour in a cement, and it is practically impossible to make a sieve fine enough to determine this, many attempts have been made to find a substitute for the sieve test.

Mr. W. F. Goreham's flourometer appears to be the nearest approach to solving the problem. The diagram given on this page shows the apparatus.

A is a cylindrical vessel open at both ends, and when in use stands on a base-plate, which closes its lower end. Into a hole in the side is soldered one arm of a breeches pipe B. The other arm outside the cylinder is clamped to a conical glass vessel C, at the bottom of which is fixed a small metal cone. The top of this pipe is closed, and through the cover passes a tube E, which can be connected to a supply of compressed air. All the joints are made tight with indiarubber washers, to prevent the escape of flour or air into anywhere excepting the vessel A. To test a sample of cement, the necessary weight is placed in the glass vessel C and the apparatus clamped tightly. A current of air is passed down the pipe E, when the flour is carried upwards and eventually into the cylinder A. What is left in the vessel C is weighed, and so the flour calculated.

The air pressure depends on the material tested and the size of the apparatus. There appears to the author to be many possibilities of error in the apparatus, but, at any rate, when used in conjunction with the sieves, some valuable results can be obtained.

OBITUARY.

MR. J. HUNT.—Mr. Josiah Hunt, of 6, Queen Anne's-gate, Westminster, died on August 21, at the age of seventy-nine. Mr. Hunt was formerly in partnership with the late Mr. John Batestone, and for about twenty-five years they together carried on practice as quantity surveyors; this partnership was dissolved in 1875; since then Mr. Hunt continued the practice by himself until about six years ago, when failing eyesight caused him to retire.

GENERAL BUILDING NEWS.

CHURCH, OSMASTON-BY-DERBY.—The foundation-stone of the new Church of St. Osmund has just been laid by Sir Robert Rodney Wilmot, Bart., at Osmaston. The present scheme is for erecting only a portion of the church. The building, when completed, will be grouped round a quadrangle, having the church on the south, the schools on the west, and the vicarage on the east. In the centre of the quadrangle will be a large stone cross, from which paths will radiate to the various entrances. The first contract is for erecting two bays of the nave, with side aisles, and the chancel and side chapel with small stone and brick groined ceiling opening from south aisle, corresponding with the north transept. The width of the nave will be 20 ft., and it will have an open timber roof, which will be surmounted by a fleche directly over the chancel arch. The extreme width across the nave and aisles will be 49 ft. 6 in. The materials will be chiefly brick. The present contract will give seating accommodation for a congregation of about 200 people. The architects are Messrs. Currey and Thompson, of Derby, and the builder is Mr. R. Weston.

NEW MISSION CHURCH, POOLSBROOK, DERBYSHIRE.—The foundation-stone was recently laid of the new mission church which is being built at Poolsbrook. Messrs. McAllister and Tench, Cambridge, are the architects for the work, the builder being Mr. S. Stone, of Staveley. The total cost will be about 900*l.*

NEW PRESBYTERIAN CHURCH, PORTSTEWART, IRELAND.—The memorial-stones were laid recently of a new Presbyterian church at Portstewart. The plans were prepared by Mr. Vincent Craig, C.E., of Belfast, and the builder is Mr. James Kennedy.

RESTORATION OF TRINITY HOSPITAL CHAPEL, LEICESTER.—The restoration and rebuilding of Trinity Hospital Chapel, Leicester, is now nearing completion. The architects, Messrs. Goodacre, recently made a survey of the chapel, and the following is an extract from their report:—"The chancel is generally in a fair state of repair, and it is only proposed to re-slate the roof of the chancel, together with the vestry leading out of the chancel. Some small repairs are also required to the roof. New spouting is to be fixed to the eaves, and the bellcot is to be repaired and painted. The portion forming the nave and transept of the chapel is in a very unsatisfactory and dilapidated state, and generally beyond repair. The whole structure is very damp. It is proposed to leave the old granite walls standing, and keep the building on exactly the same dimensions as at present. The third brick wall on the west side of the south transept is to be taken down and rebuilt with granite. Two new windows are to be inserted in the walls, and the present windows restored. All the granite walling is to be cleaned and pointed externally. The doorway in the north transept is to be built up on the inside with granite, and the buttress to be carefully restored. It is also intended to build the piers and arcade on the same lines as the original, and to put a new roof over the nave on the same lines as that over the chancel, thus opening up the old chancel arch. The floor is to be laid with wood blocks on a foundation of cement concrete. The old seats are to be removed. They are very rotten, and quite beyond repair; it is proposed to replace them with suitable seats or chairs. The chapel is also to be fitted with a service of gas pipes and brackets, and the building will be warmed by continuing the heating arrangements in the hospital into the chapel. Every care will be taken to preserve all old features of the original work. It is estimated that the restoration will cost about 1,000*l.*"

SCHOOL FOR DEAF AND DUMB, LIVERPOOL.—The new Council school for deaf and dumb children is situated in Olive-street, almost opposite the old institution. It has a frontage both to Olive-street and Crown-street of 120 ft. There are separate entrances for the boys and for the girls, from their respective playgrounds, and access is at once obtained to a hall, 28 ft. wide and 38 ft. in length, with a clear height to the tie-beams of the roof of 24 ft. In this hall the scholars will be marshalled, drilled, and inspected. Surrounding the hall are eight separate classrooms, with windows on the outside walls, whilst glazed partitions divide the classrooms from the hall. By means of two fireproof staircases, one for the boys and the other for the girls, a projecting gallery overlooking the hall is reached. This gallery connects with eight other classrooms modelled on the same plan as the classrooms below. On this floor are provided an assistant head teacher's room, and two rooms for male and female teachers respectively. The head master's room is on the ground floor. The architects are Messrs. G. Bradbury and Sons. As regards the alterations in the old institution, which will now only be used for the boarding and the home life of the children, the plans of Mr. Bradbury embraced the conversion of the large schoolroom, 40 ft. by 50 ft., to the purposes of a recreation-room for the boys, whilst the experiment is being tried in this room of providing each boy with a locker in which to deposit his personal belongings. A similar room is provided for the girls, who will have a room 40 ft. long by 20 ft. in width. In order to effect other improvements, so as to bring the institution up to date, the committee purchased a number of houses in Stanley-place, which have been demolished in order to allow of the admission of more air and sunlight into the playgrounds and buildings. Two other houses in Olive-street, which were also purchased, are being converted into a laundry, and above the laundry there will be sleeping accommodation for the laundry maids, who are deaf and dumb, and former pupils of the institution. There is also a swimming bath lined with white tiles. One room, 23 ft. square, is also being converted into a bathroom. Each floor in the building is connected with two fireproof staircases. Electric lighting is also introduced.

SCHOOLS, GRIMSBY.—New school buildings have just been opened at Grimsby by Sir G. Doughty. They occupy a site bounded on the north by Harold-street, and on the south by Castle-street. The buildings cover an area of about 1½ acres in extent, and give a total accommodation for 1,460 children in the following departments:—Mixed school, 1,160; infants' school, 300; manual instruction room, laundry, and cookery centre. The premises comprise a mixed school, two stories high, fronting Harold-street, on the central hall

system, the ground floor having a large central hall, with two classrooms off same, which can be thrown into large hall when occasion requires by removing sliding partitions. To the right and left of central hall run corridors with four classrooms at either end. At the extreme ends of the buildings are arranged cloak-rooms, lavatories, teachers' rooms, and main entrances for junior and senior boys and girls; also stone staircases leading to the first floor school which is similar in every respect to the ground floor, having another central hall over the one below, and classrooms, corridors, cloak-rooms, lavatories, and teachers' rooms, stores, etc. Behind the mixed school, and on the east and west sides of the site respectively, are arranged the manual instruction-room for woodwork and cookery, and laundry centres; the whole of the centre of the site is occupied by very large asphalted playgrounds, separated for boys and girls, having the usual out-offices, play-sheds, etc. Fronting Castle-street, an infants' school is arranged, one story high. This is also planned on the central hall system with classrooms, one of which is specially fitted up for the babies. This school also has a separate playground and out-offices. The buildings are built of red stock bricks, with stone dressings, and slated roofs, having ornamental gables and ventilation turrets over each central hall. The floors and staircases are of fireproof construction, and all classrooms and hall floors laid with solid wood blocks. The walls of all rooms throughout are of glazed bricks from floor to ceiling, and the heating of all departments is by hot water pipes, the furnace vaults being in the basement. The building contract has been carried out by Messrs. J. H. Thompson and Sons, contractors, Grimsby. The school furniture and desks, which are all of orham wood, have been executed by Illingworth Ingham and Co., of Leeds, and the heating is by Messrs. King and Co., of Hull. The mason's work has been carried out by Mr. Green, Grimsby, and the plumbing and glazing by Mr. D. J. Dolby, Grimsby; the slating by Messrs. Dawber, Townsley, and Co., Ltd., of Grimsby, and the iron fence railings and gates by Messrs. Sharpe, Ltd., of Grimsby. The buildings are lit by electric light, the installation for which has been carried out by the District Electrical Company, Wolverhampton, under the superintendence of Mr. W. A. Vignoles, Borough Electrical Engineer. The asphalted playgrounds have been executed by Mr. White, of Grimsby, and the folding stools for the central halls have been supplied by the Wellington Furnishing Company, Grimsby. The marble tablet to commemorate the opening, which is fixed in the ground floor central hall of the large school, is the work of Mr. Ray, carver, Grimsby. Mr. Burnett has acted as the clerk of works. The buildings and scheme have been carried out from the designs and under the superintendence of Mr. Herbert C. Scaping, architect, Grimsby.

MISSION HALL, TUNBRIDGE WELLS.—The opening of the new Wesleyan Mission Hall, which has been erected in Hill-street, Tunbridge Wells, took place on the 17th inst. The building is of red brick, and accommodation is provided for 270 people. Mr. C. H. Strange was the architect of the work, the builder being Mr. Jarvis.

A PEOPLE'S PALACE, LIVERPOOL.—The "Workmen's Hostel," erected on the site of the old St. James's Market, Great George-street, out of the moneys of the David Lewis Trust Fund, is now, says the *Liverpool Daily Post*, open for the reception of lodgers. The building has its main frontage in Great George-place, its side fronting to Nile-street, and its back in Rathbone-street. The cost of building and furnishing it, it is understood, is about 100,000*l*., and the structure has been erected from designs and under the superintendence of Mr. J. Francis Doyle, architect, Liverpool. The main frontage extends to 174 ft. The side frontage in Nile-street has a length of 146 ft. In all, the site of land embraces 220 ft. by 176 ft. The buildings are set back from the boundary some 21 ft. The materials used in the facing of the main outer walls are a special brick and terra-cotta, with green slates on the roof. The main entrance to the public hall and club-room is from Great George-place, and is 12 ft. wide. This means of ingress has a hall 50 ft. by 20 ft., arched and finished in tiles and faience. The public hall, which is 90 ft. by 42 ft., and 35 ft. high, is in the centre of the building, and will accommodate upwards of 800 persons. It is complete in its appointments, with separate stage entrances from Rathbone-street, stage boxes, gallery, and greenrooms for both sexes. Provision has been made for eleven sources of egress. All the staircases and floors are fireproof. The social club consists of a number of large rooms, a billiard-room, 67 ft. by 30 ft., two committee-rooms, three social clubrooms, 50 ft. by 26 ft., and also a special clubroom and toilet facilities for females. To the south of the clubroom on the same site space has been left open for the erection of a gymnasium, 132 ft. by 54 ft. The "Workmen's Home" section of the building is approached and entered through turnstiles from Nile-street, off Great George-street. Just over the threshold the visitor finds himself at the office, and adjacent to this is the master's house. The quarters assigned to the superintendent are in the north-east corner of the building. The reading-room is 50 ft. by 20 ft. In a central position between this room and the dining-room, with an area of 20 ft. by 15 ft., is the provision shop, or stores. There are lifts conecting the shop with the kitchens in the basement. The dining-room, 80 ft. by 41 ft., contains two ordinary fireplaces and a cooking fire, with lodgers' scullery. The kitchens, sculleries, pantries, and stores are in the basement. In the basement are also numerous lockers and storerooms for the accommodation of the things belonging to the boarders at the home. On the upper floors, approached from the large main staircase by three independent gangways, are the sleeping cubicles. These are arranged in groups for easy working and control. There are also two other stone staircases for exit in case of necessity. In view of any possible outbreak of fire, all the floors and staircases are fireproof. The number of cubicles for which arrangements were made in the original design was over 380. Over the billiard-room is a large flat roof, which it is designed shall be for the use of the men who sleep in the home, and who will thus be afforded an opportunity of getting fresh air.

THEATRE ROYAL, HALIFAX.—This theatre, which is now being rebuilt, occupies the site of the old theatre, including the old Shakespeare Hotel, the shop adjoining, and four cottages, etc., in Shakespeare-street. The site is rectangular and open on three sides. The auditorium is 54 ft. deep and 57 ft. wide within inner walls, and outside these are corridors and staircases 5 ft. wide up to outer wall. The ceiling will be about 50 ft. above the pit floor. The roof over the auditorium will be carried by steel principals in one clear span. The proscenium arch is 30 ft. wide and 30 ft. high, and the stage has a clear depth of 37 ft., and a width of 69 ft. The height of the grid is 50 ft. above stage floor. There are eleven dressing-rooms provided for the artistes in close proximity to the stage, each fitted up with modern sanitary requirements. The staircases throughout the house are fireproof, as well as the partitions to the dressing-rooms. The theatre will accommodate about 2,000 people. The building has been designed and is being carried out by Messrs. Richard Horsfall and Son, architects, Halifax.

FREE LIBRARY, WALKLEY, SHEFFIELD.—The foundation-stone of the Free Public Library at Walkley, which, as far as the building is concerned, is the gift of Mr. Andrew Carnegie, was laid on the 9th inst. Mr. H. L. Paterson, of Sheffield, is the architect. The building is at the corner of South-road and Walkley-road, advantage having been taken of the site to place the main entrance at the angle. This takes the form of a circular portico, and gives access to the vestibule, 9 ft. wide, out of which open on the right and left respectively, the women's reading-room and the men's reading-room, the latter facing South-road, and the former facing Walkley-road. At the end of the vestibule opposite to the entrance are folding doors leading into the lending department, which fills up the angle between the men's and women's reading rooms. A curved counter separates the public space from the book store, which will be large enough to contain stacks for 13,000 books. These stacks will be arranged radiating. The committee and librarians' room is placed on the Walkley-road front, beyond the women's reading-room. Lavatories for the public as well as for the staff are provided. The building will be faced with rockies from the Bole Hill quarries, with Stoke stone dressings, and the roof will be slated. The floors will be laid with wood blocks on concrete. A dado of glazed brick will be provided in the vestibule, and the lavatories will also be lined with glazed brick. The internal woodwork will be pitch-pine varnished. It is proposed to heat the building by hot water at low pressure, and this will be combined with the ventilation, so as to secure efficiency in both. The contract for the work has been let to Messrs. D. O'Neill and Son, of Sheffield, the amount being 3,259*l*. 10*s*., and the glazed bricks are being supplied by the Wortley Fire Clay Company.

HOTEL, RYTON.—The new hotel, built for the firm of James Deuchar and Co., Ltd., situated at the junction of the Carlisle-road and Whitewell-lane-end, was opened on the 10th inst. It is a building of red pressed brick, half-timbered, with cement stucco work. The frontage is 80 ft., the ground floor containing a bar fitted in pitch-pine, 40 ft. by 20 ft., two other sitting-rooms on the ground floor, each 37 ft. by 18 ft., with latrines and lavatory conveniences. The upstairs is approached by a hall at the east end of the building, containing a staircase leading to a dining-room, 43 ft. by 17 ft. Adjoining this is a tearoom, 18 ft. square. The remainder of the first floor is taken up in forming apartments for the manager, also a kitchen. The architects of the building are Messrs. W. and T. R. Milburn, of Sunderland; and the new building was erected by Mr. R. M. Storey, contractor, West Bolton.

WAREHOUSE AT THE N.E.R. NEW BRIDGE-STREET STATION, NEWCASTLE-ON-TYNE.—In connexion with the extensive improvements now being carried out at New Bridge Station, one of the features is a goods warehouse, now in course of erection. This warehouse, which has been designed by Mr. William Bell, Architect of the North-Eastern Railway Company, is entirely built of ferro-concrete, on the Hennebique Patent System. The dimensions of the New Bridge-street warehouse are 430 ft. in length, 180 ft. in width, and it will be 92 ft. in height. The basement is to be used as a low-level and the ground floor as a high-level goods station, the two levels being connected by waggon hoists. There will be six sidings on the ground floor into which the goods trains will be run for loading and discharging. As each loaded waggon may weigh upwards of 42 tons, this floor will have to support an enormous load when several trains are in the station at the same time. The pillars supporting this floor had to be as few as possible so as not to interfere with the heavy traffic in the low-level station; this rendered very large spans necessary for the main beams. Some of the beams in this building, having a span of 52 ft., are to be tested after completion under a superload of 400 tons, and each of the main pillars has to support over 1,100 tons. The first floor will be used for storage of goods; the second floor and part of the other floors are specially set apart for the storage of flour. The roof will be flat. The contractors are Messrs. Joseph Howe and Co.—*Newcastle Chronicle.*

FOREIGN.

FRANCE.—At the church of St. Germain l'Auxerrois, Paris, the frescoes painted by Joseph Guichard, from 1842 to 1845, have been undergoing restoration. These frescoes, which form the decorations of the chapel of Saint Landry, represent on the one side St. Landry founding the Hôtel Dieu; and on the other side, St. Landry providing food for the people of Paris.——At the Jardin des Plantes, Paris, the old monument called the Pavillon Chevreuil, dating from the time of Buffon, has been restored.——A competition has been opened for the selection of the best type for the small pavilions which are erected along the boulevards at Paris, on the occasions of the fêtes at Christmas and on the annual national holiday.——The church at Bussy-Lettrée (Marne), an ancient and fine monument, has been seriously damaged by lightning.——A committee has been formed at Saint-Junien (Haute Vienne) for the erection of a monument to Corot, who was particularly fond of this district, and has illustrated many of its scenes in his pictures.——A railway track has been formed between the terminus station of Fayet-St. Gervais and the summit of the Aiguille-du-Goûter (Haute Savoie). The carriages are furnished with a cog-wheel system.——A new theatre is to be built at Vannes (Morbihan).——A new hospital is shortly to be built at Dunkerque.——A competition has been opened at Lyons for a block of artisans' dwellings.——M. Gustave Geffroy, the art-critic, has been created an Officier of the Legion of Honour; and the grade of Chevalier has been conferred on M. Georges Picard, the painter who so ably decorated the Galerie Lobau at the Paris Hôtel de Ville, and on M. Deverin, architect in the Department of Monuments Historiques.——The death is announced, at the age of fifty-six, of M. Louis Prétet, whose name was well known among French artists, and who for many years filled the office of Commissaire-Général of the Société des Artistes Français (Old Salon). M. Roybet has introduced his portrait in several well-known pictures.

GERMANY.—The memorial to the Emperor Frederic which is to be erected on the new bridge before the Emperor Frederic Museum is to be unveiled on October 28; the statue was the work of the late Rudolf Maison, of Munich.——A book is being published in

Berlin entitled "The English House" (Das englische Haus), by Hermann Muthesius; the work is to appear in three volumes, and will contain an exhaustive description of English private houses, their situations, their external and interior decorations, their gardens, etc., which are further explained by numerous illustrations.——The new Hospital for Incurables at Beuthen, designed by the architects E. and G. Zillmann, is completed.——The architect Herr Ludwig Hofer has designed the plans for the Natural History Museum which the Senkenberg Natural Research Society is erecting in Frankfort; the building is to cost 1,200,000 marks.

AUSTRIA.—The ancient Poor House in Vienna is to be demolished, as, owing to the raising of the pavement, one floor is already sunk below the street level; the new Poor House is to be erected on a different site.——The Military Geographical Institute at Vienna is progressing under the management of Herrn Stigler and Siedeck; the building will cost 2,000,000 kronen.——The Roman Museum at Deutsch-Altenburg, on the Donau, was opened in the presence of the Emperor; the building was designed by Herrn Ohman and Kirstein, and cost 106,000 kronen.

SWITZERLAND.—The Museum at Bern is to be transformed into a building, suitable for the use of the "Kantonalbank"; the work is being carried out by the architect Herr A. Brünning, of Zurich, and is to be completed by September, 1905.——A church and a statue in memory of the Empress Elizabeth are to be erected at Geneva.——The building of the new Art Gallery at Zurich has been entrusted to the firm of Curgel and Moser, in Karlsruhe.

MISCELLANEOUS.

CALIFORNIAN TIMBER.—In a report sent home by Mr. Bennett, British Consul at San Francisco, dealing with the trade and commerce of 1903, it is mentioned that the receipts of pine, spruce, and fir lumber from California, Oregon, and Washington were 366,653,142 ft., and of Redwood from all California mills 329,855,550 ft. Of this nearly 10,000,000 ft. were sent to Australia, 2,250,000 ft. to the United Kingdom, and nearly 5,000,000 ft. to Mexico. The Californian redwood is described as being "the most important timber product of the State. Redwood burns with difficulty, charring as a rule, and is practically impervious to decay when used in damp places. It is one of the most durable woods known, and is greatly used in railway and bridge construction, and frequently for piping. It was recently recommended for one of the great tunnels of the Ontario Power Company at Niagara, but the recommendation was not acted upon."

ROMAN REMAINS, CAERWENT.—Within the last few days discoveries have been made at the Roman city of Venta Silurum (Caerwent, Monmouthshire). The south gate has been discovered, and an inscribed stone has been brought to light. The city was rectangular in form, and had one entrance near the centre of each of its four sides. Remains of all except that on the south were previously known to exist, while the site of the south gate was supposed to be marked by a lane which here passed through the city walls. The gate itself has, however, come to light some 50 ft. further west, and forms a most interesting parallel to the north gate. Each of them had an internal and an external archway, with a span of about 9 ft., the former being to a great extent preserved in the south gate, which has the spring of the arch on each side, while the north gate has the spring on one side only. Between these two arches was a rectangular space with a flat ceiling, over which must have passed the walk which led along the top of the city walls. The gateway had been blocked with rough stonework in Roman times. The inscribed stone which has been discovered is a dedication to Mars by M. Nonius Romanus, and was set up in the year 124 A.D.—*Birmingham Daily Post.*

MEMORIALS IN LONDON.—A tablet has just been affixed on the front of No. 67, Wimpole-street, W., where Henry Hallam lived during the period 1819-40; the house is that which Tennyson mentions in a well-known stanza of "In Memoriam."—The much-vexed question of the birthplace of Lord Beaconsfield seems to be now determined by the fact that a similar tablet has been placed in the front wall of No. 22, Theobald's-road, formerly No. 6, King's-road, near Bedford-row. Other places which confend for that honour are St. Mary Axe, No. 2, James-street, Adelphi, and No. 6, on the west side of Bloomsbury-square; but it appears that the Disraelis did not remove to the last-named house until some years after Lord Beaconsfield's birth in 1804. A tablet has also been affixed to No. 1, Devonshire-terrace, at the corner, north-west, of Marylebone-road, to commemorate the residence there, in 1859-51, of Charles Dickens.

DRURY-LANE THEATRE.—The theatre will be closed until next Christmas for the carrying out of certain structural alterations and improvements, in accordance with the terms of the award recently made by Mr. John Slater, F.R.I.B.A. Mr. Slater was appointed by the First Commissioner of H.M. Office of Works to act as arbitrator between the London County Council and the directors of Theatre Royal, Drury-lane.

IMPROVEMENTS IN STEPNEY AND THE VICINITY.—The Borough Council of Stepney have unanimously decided, at a special meeting held a few days ago, to carry out a widening of the western portion of Great Alie-street, Whitechapel, in which their offices are situated, in connexion with the scheme for a widening of Mansell-street, and to put in force the provisions of Michael Angelo Taylor's Act (of 1816) for the acquisition of the property required for the improvement. Two-thirds of the cost will be borne by the London County Council, whose recommendations for a further widening of Narrow-street, near Dowson's Dock, Limehouse, are under consideration of the Borough Council.

BRITISH WEIGHTS AND MEASURES.—A provisional committee of the British Weights and Measures Association, formed for the defence, standardising, and simplifying of British weights and measures, has just been constituted. The committee, which consists of ten members, includes Mr. A. H. Adams, of the Sturtevant Engineering Company, London; Mr. R. Kaye Gray, President of the Institute of Electrical Engineers; Mr. Henry Lovatt, of Wolverhampton, builder and contractor; and Mr. Thomas Parker, of London and Wolverhampton, consulting engineer, who is now engaged upon the electrification of the Metropolitan Railway line and rolling stock.

THE ORDNANCE SURVEY.—The annual report of the ordnance survey for the twelve months ended on March 31 has just been issued. The revised outline maps, to the 1-in. scale, of the United Kingdom are now completed and published; the completion is also announced of the revised four-mile outline map of the United Kingdom, as well as of the coloured four-mile map, together with the ten-mile revised map, in both outline and colour, with hills, of England, Wales, and Scotland. Rapid progress is being made with the two-mile map of England, and the 1-in. coloured map of England and Wales is finished. The report states that the authorities will revise the 1-in. outline maps of the United Kingdom at intervals of fifteen years, having finished the current series with the maps of Ireland, which were published in the course of the period under review.

UNIVERSITY COLLEGE SCHOOL.—For the new school buildings a site has been acquired in West Hampstead, at the junction of Arkwright-road and Frognal. It is proposed to expend an estimated sum of 50,000*l.* upon the erection of buildings to accommodate 450 boys, with provision for extension hereafter to accommodate 150 more.

CAPITAL AND LABOUR.

EMPLOYMENT IN THE BUILDING TRADES.—According to returns supplied by sixty-eight Employers' Associations, whose members are estimated to employ about 83,500 building operatives of all classes, and by trade unions, with an aggregate membership of about 180,000, employment in the building trades generally continued dull during July, and, on the whole, showed little change as compared with June. It was, however, rather worse that a year ago. With bricklayers employment is reported as dull, and about the same as a month and a year ago. It is moderate with masons in England, but dull in Scotland. With carpenters and joiners employment is bad. The percentage of unemployed trade union carpenters and joiners was 5·7 at the end of July, compared with 6·3 in June, and 3·3 a year ago. Employment with painters generally has been dull, and about the same as a month ago in England, but worse in Scotland. It is worse generally than a year ago. With plasterers and plumbers employment has been bad. The percentage of unemployed trade union plumbers was 10·4 at the end of July, compared with 9·9 at the end of June, and 6·7 a year ago. With slaters and tilers in England and Ireland employment continued dull, but in Scotland they were fairly well employed.—*The Labour Gazette.*

Legal.

WEST END ANCIENT LIGHT DISPUTE.

IN the Vacation Court on Wednesday, counsel applied, *ex parte* to Mr. Justice Bigham, on behalf of the plaintiff in the case of Milton *v.* Maskelyne, for an interim injunction over next Wednesday, restraining the defendant from increasing the height of his building so as to obstruct the plaintiff's ancient lights. The learned counsel stated that, if the defendant's building operations were allowed to go on uninterrupted until Wednesday next, his building would by then be completed, and it was unusual for the court to order a building to be pulled down when once it had been put up. If his lordship looked at the affidavits which had been filed, he would find that there was an agreement to submit the question to arbitration.

His lordship: Are you issuing a writ notwithstanding the agreement?

Counsel: Yes. If the judge finds that there is not in the letters a sufficient agreement, then we shall rely on our common-law rights to restrain the building.

His lordship asked what the building complained of was.

The learned counsel replied that it was the St. George's Hall, in Langham-place, the plaintiff's building abutting on the south side of the defendant's building.

In the result, his lordship declined to grant the injunction, but gave the plaintiff leave to serve notice of motion with the writ for Wednesday next.

PATENTS OF THE WEEK.

APPLICATIONS PUBLISHED.*

12,168 of 1904.—J. KOCKS: *Covers for Keyholes.*

This invention relates to a cover for keyholes, the object being to obviate the disadvantages appertaining to keyholes, in that it is impossible for a listener not only to listen to the conversation occuring in a room, but also to see through the keyhole into the room. The invention consists in placing over the key-stem, before insertion of the key into the lock, a disc or plate of elastic material.

12,985 of 1904.—J. W. CRAVEN and J. H. CRAVEN: *Machinery for Making Briquettes, Bricks, Blocks, and Tiles, such as Briquettes of Artificial Fuel, or Bricks or Blocks of Sand and Lime, etc.*

A machine for making briquettes, bricks, blocks, etc., consisting of a horizontally-arranged mould-table, in combination with a vessel, or mill, immediately above the line of travel of the moulds, and provided with an opening, with which the moulds successively come into coincidence, and with blades or fillers rotating in opposite directions, so as to equally pass the matter from the said vessel or mill through the said opening into the said moulds.

20,057 of 1903.—E. B. L. MORRIS: *Automatic Fire-Extinguishing Appliances.*

This consists in the combination of a pair of valves of different areas, connected by a hollow spindle working on a guide, means for allowing water to enter the spindle when the valve is opened and enclosing it there so that the valve is prevented from closing again.

12,439 of 1904.—F. HUBBER and W. G. HIGGS: *Electric Fire Alarm, and the like Signalling Apparatus.*

An electric fire alarm, and like signalling apparatus, consisting in the combination of a mechanically-operated ring of contacts with relay, line, and battery connexions, said ring of contacts being brought into operation by means of an electro-magnet operated by a push, or automatically, whereby a predetermined number of intermittent synchronous impulses will be transmitted.

16,003 of 1903.—P. TIMOFEEFF: *Construction of Pavement, Covering, or Flooring for Roadways, Pathways, Floors, Stairs, Ships' Decks, Permanent Way of Railways, etc.*

A new paving, flooring, or covering for roads, pathways, floors, stairs, ships' decks, railways, etc., consisting of basket-like, flat structures, formed by either plaiting or weaving metal strips or wires, or by means of stamped and perforated steel, or other suitable metal, such structures being formed open on one side with shallow side edges, so as to be adapted to be bedded firmly with their open sides downwards upon the ground or upon a layer of sand, or the like.

* All these applications are in the stage in which opposition to the grant of Patents upon them can be made.

17,738 of 1903.—J. A. HART: *Jacketing of Pipes, or Passages for Conveying through Rooms, etc., Air which is of Lower Temperature than the Dew Point of the Atmosphere of the Room, etc.*

A jacketing for pipes or passages, the said jacketing consisting of a covering of non-conducting material, this in turn being covered with thin metal which is smooth on its exterior and connected at its edges.

17,755 of 1903.—J. A. HART: *Apparatus for Ventilating with Conditioned or Filtered, Cooled, or Warmed and Moistened Air.*

An apparatus for ventilating with conditioned, or filtered, cooled or warmed, and moistened air, in which moistened permeable material is employed; the arrangement of the said permeable material in the air passage, chamber, or casing, in a number of folds, or depending loops, or series of sheets so that a set of passages is provided for incoming air, and another set of passages is provided for the outgoing air by the said folds, loops, or sheets.

21,389 of 1903.—H. V. JORGENSEN and C. H. SORENSEN: *Hot-water Heating Apparatus.*

A hot-water heating apparatus with a pipe from the top part of the rising pipe, back to the boiler, which causes a faster movement of the water in the rising pipe, until the temperatures in the top and the bottom parts of the rising pipe are alike.

23,452 of 1903.—J. HUSSEY and J. E. HUSSEY: *Water Heaters.*

A water heater, consisting in the arrangement of a hollow sheet-metal cone, the interior of which is designed to be heated by a burner near its base, whilst the water to be heated flows over the outer surface of the cone from the apex to the base.

16,197 of 1903.—C. J. O. BERGSTRÖM: *Ventilators.*

A ventilator consisting in the combination with a strip of suitable material forming a valve of a baffling device or deflector for deflecting the current and preventing draughts, the said device or deflector being pivoted and adapted by appropriate means to turn towards and from the valve when the latter is drawn and withdrawn for the purpose of pressing the valve upon its seat, and thus obtaining a positive closure, and for releasing the valve from its seat.

18,258 of 1903.—F. C. IHLEE: *Drawplate Ovens.*

An oven consisting in the combination of a drawplate, balls supporting it, guides supporting the balls, rails supporting the guides, a second set of balls supporting the rails, guides supporting them, stops inside the oven preventing the tilting of the rails when in the forward position, and balls between the rails and stops.

19,111 of 1903.—F. SCHAETZKE: *Window Sashes.*

A window sash made tight by arranging that its freely moving parts glide over slanting surfaces on the window casing, the essential feature of which is that the sashes, while being raised and lowered, move about freely in the casing, that is to say, do not run in lateral guiding grooves of the same, the tightening of the window being effected by the sashes shortly before they reach the closing position being turned out of the plane in which they move by the slanting surfaces, in consequence of which they are pressed with their front or outside surfaces against a tightening ledge.

20,371 of 1903.—A. PARKER, F. L. JACKSON, and E. E. PRIOR: *A Draught, Rain, and Dust Excluder for Doors.*

Means for excluding draught, rain, and dust from passing beneath doors, consisting of a groove or tunnel formed in the bottom edge of the door and extending across the width thereof, a roller extending along the length of the groove and carried by bearings at each end thereof, a flat plate tangentially or radially secured to the roller throughout its length, a pinion secured upon one end of the roller, and means for engagement with such pinion whereby it may be turned, so as to revolve the roller, upon the closing and opening of the door.

20,377 of 1903.—P. R. J. WILLIS (F. S. Cormier, Hon. A. D. Richard, and E. T. Gaudet): *A Fire Escape.*

A fire escape consisting of a rectangular framework, a windlass mounted therein, a cable wound upon said windlass passed over a sheave and carrying a basket, and a regulating device consisting of a fan-wheel revolubly mounted in the framework and geared to said drum, the gearing comprising ratchet mechanism whereby the drum and fan-wheel may run independently of each other during the act of winding the cable upon the drum, and a brake adapted to impinge upon the periphery of the regulating device and be controlled by a person in the aforesaid basket through the medium of a cord.

20,494 of 1903.—C. T. PRICE: *Apparatus for Heating Apartments or other Enclosed Spaces.*

An apparatus for heating apartments or other enclosed spaces, comprising a cover or casing mounted upon supports or suspended, a lining of fireclay, terra-cotta, art-clay, or like heat-retaining and radiating material, and a gas lamp or other source of heat arranged beneath the said cover and lining adapted to heat the same.

20,676 of 1903.—A. L. DUGON: *Buffer Stops for Doors and the like.*

This consists in the combination, in a buffer stop of the piston type for doors and the like, of a metal spring or springs serving as the cushion, and a washer retaining it or them in position between the piston and the support to which the stop is fixed and protecting the support and the spring or springs from damage.

20,981 of 1903.—E. WOODS: *Ventilators.*

A ventilator consisting in the combination of two dish-shaped pieces, or a dish-shaped piece and an annular piece, each having corresponding holes therethrough at the sides, and one being movable circularly about the other, and grooves in the uppermost one of the pieces for antifriction balls or rollers bearing against the other piece, the outermost piece or both pieces having an opening or openings through the bottom and having a movable cover or covers thereto.

22,490 of 1903.—C. SHOWELL: *Manufacture of Door or the like Bolts.*

The manufacture of door or the like bolts from a rolled or drawn rod of sectional shape, such cut-off rods being drilled longitudinally to within a short distance of their ends to form the barrel and the shoot, with bolt secured therein.

22,670 of 1903.—W. P. THOMPSON (Duplex Radiator Company): *Baffle Plates Mounted in Heat Passageways.*

A plurality of baffle plates mounted in a radiator tube, said plates being oval in form, and the ends of said plates being in contact with portions of the walls of said tube, and the sides of said plates being at a short distance from the central part of the sides of said tube.

22,671 of 1903.—W. P. THOMPSON (Duplex Radiator Company): *Radiators Heated with Gas or Oil Stoves.*

A radiator heated by a gas or oil stove, having a base, composed of separable parts, part of said parts having a rib or ledge adjacent to the bottom thereof, and a second rib or ledge intermediate of the sides thereof, plates or floors extending transversely of the base, and resting on said ledges, said base having perforations between said floors, and the upper floor having perforations.

22,672 of 1903.—W. P. THOMPSON (Duplex Radiator Company): *Holders for Baffle Plates in Heat Passageways.*

A holder for baffle plates, comprising a flat band bent to form a plurality of loop-shaped crimps, substantially oval in form, whereby gripping jaws are formed adjacent to the body portion of said holder.

23,256 of 1903.—C. SHOWELL: *Casement Opening and Closing Mechanism.*

A casement opening and closing mechanism, consisting in the combination of a rod, upon which are formed worm teeth, a shoulder or flange, an extended part, therefrom, and two discs mounted upon such extended part, and the aforesaid rod being made to serve for the locking of said discs in position.

24,060 of 1903.—C. E. MUGGERIDGE and THE VAN KANNEL REVOLVING DOOR COMPANY, LTD.: *Revolving Doors.*

This invention relates to revolving doors of the kind or type, comprising a number of wings which radiate from a central pillar, and are capable of rotating between suitably-shaped screens or walls, and which are adapted to give way, collapse, or fold together when extra or undue pressure is put upon them, as would be the case with a panic-stricken crowd, hurriedly emerging from a theatre, or other enclosure.

24,440 of 1903.—J. J. JAMES: *Manufacture of Door Silencers.*

A silencer, buffer attachment, or elastic stop for use in connexion with doors, consisting of a block of elastic material, having a wing or laterial projection with a broad or extended abutment surface presented to the door, and provided with a metallic liner or ferrule to receive the shank of an attachment screw or nail.

759 of 1904.—J. FIDDES: *Means for Automatically Extinguishing Fire in Buildings.*

A fire sprinkler, consisting in the combination with a water pipe, having a discharge outlet, destructible or movable means for normally preventing the issue of water from said outlet, a taut and metallic wire, and a weighted lever carried by said wire, and stretching said wire, said lever being arranged on sagging of said wire due to expansion, to be automatically released so as to swing said outlet, closing means to break or dislodge the same.

1,487 of 1904.—G. PAGEL: *Apparatus for Drying Bricks.*

A plant for drying bricks, consisting in the construction of one or more escape conduits for hot air, and feed conduits to convey the hot and dry air from the fire-box of the kiln to the drying compartment adjoining thereto, where it combines with moisture evaporating from the bricks placed therein and escapes, the incoming and escaping quantities being regulated in accordance with requirements by sliding valves.

9,077 of 1904.—G. H. RADEMACKER and J. C. F. BOLL: *Presses for Moulding Artificial Stone Blocks.*

A press for moulding artificial stone blocks, comprising, in combination, a box, a cover formed in sections, separated by longitudinal interstices, and hinged partition plates turnable independently of said cover, and adapted to pass through said interstices.

9,578 of 1904.—F. JACKSON: *Flushing Cisterns for Water-closets and the like.*

A flushing device, comprising a channel, an outlet pipe, a movable casing upon said pipe co-acting with the same to form a syphon, a float for supporting said casing, and an air inlet valve in said casing adapted to be opened to break the syphon when the said float and casing lowers a predetermined distance.

12,237 of 1904.—J. BARDSLEY: *Door Checks and Closers.*

A door closer, comprising an enclosing casing, the actuating spindle mounted therein for connexion with the door, and having a crank-arm initially extending at an angle to the longitudinal centre of said casing, combined with bell-crank lever pivotally mounted within said casing on a pin at one side of the centre of said casing, a link secured at one end to said crank-arm by a pivot-pin, and at the other end by a pivot-pin to one arm of said bell-crank lever, and the confined spring connected with the other arm of said bell-crank lever, said other arm being about in line with the longitudinal centre of said casing.

12,359 of 1904.—J. ROBERTS: *Apparatus for Raising Submerged Broken Rock, and other Matters from Docks, Pit-shafts, Bore-holes and the like.*

Apparatus for raising broken rock or other matters from under water, comprising a tube or working barrel, a sliding piston therein, means for submerging the tube and pressing it down into the ground at the bottom, and means for raising the piston in the tube during the submersion, so as to create a partial vacuum in the tube, whereby, on raising the tube, water, stones, and earthy matters will be sucked into the tube, and can be raised to the surface by the tube in combination or not as required with an inlet valve at bottom of tube.

14,335 of 1904.—D. G. SAUNDERS, JUN.: *Sash Fasteners.*

A sash fastener, a latching bar, tightening lugs rigidly mounted relative to the latching bar; a latch pivotally mounted and adapted to engage the latching bar, and tightening lug housings rigidly mounted relative to the mounting of the latch, and adapted to engage the tightening lugs, so as to tighten the latching bar relative to the latch and its mounting.

SOME RECENT SALES OF PROPERTY:

ESTATE EXCHANGE REPORT.

August 4.—By MORRIS, MARSHALL, & POOLE (at Minsterley).

Worthen, Salop.—Hope Hall Farm, 124 a. 3 r. 30 p., f.	£1,346

August 11.—By HAMPTON & SONS (at Driffield).

Foston-on-the-Wolds, Yorks.—Carr House and Town Farms, 454 a. 1 r. 26 p., f.	13,100
Freehold house, joiner's s., and 1 a.	305
Two cottages and 0 a. 2 r. 26 p., f.	220
Five enclosures of accommodation land, 31 a. 2 r. 15 p., f.	1,025
Brigham, Yorks.—Freehold house, joiner's s., and 7 a. 0 r. 12 p.	680

August 16.—By KIVELL & HARRIS (at Stratton).

St. Genny's, Cornwall.—Dizzard, Trengayor, Treacreek, and Trelay farms, 610 acres, f.	£4,400
Poundstock, Cornwall.—Trewint and Foxwell Farm, 202½ acres, f.	1,120
Jacobstowe, Cornwall.—Trefrida Farm, 126½ acres, f.	1,200

August 17.—By A. DOWELL (at Edinburgh).

Iron, Perthshire.—Estate of Glenfarg, 814 acres, net rental 539*l.*	15,500

By LEONARD CAVEY & CO. (at Catford).

Forest Hill.—19, Hurstbourne-rd., u.t. 79 yrs., g.r. 5*l.* 10s., y.r. 28*l.*	290
Catford.—394, Stanstead-rd. (s.), u.t. 74 yrs., g.r. 9*l.*, y.r. 40*l.*	305

August 18.—By BOYCE, EVENS, & CARPENTER.

Hoxton.—26, Rushton-st., u.t. 30 yrs., g.r. 4*l.* 10s., w.r. 49*l.* 8s.	295
65, Huntingdon-st., u.t. 65 yrs., g.r. 7*l.*, w.r. 59*l.* 16s.	395
112, Hoxton-st. (s.), u.t. 65 yrs., g.r. 24*l.*, y.r. 55*l.*	360
6 and 7, Reeves-pl., f., w.r. 46*l.* 16s.	570

Contractions used in these lists.—F.g.r. for freehold ground-rent; l.g.r. for leasehold ground-rent; i.g.r. for improved ground-rent; g.r. for ground-rent; r. for rent; f. for freehold; c. for copyhold; l. for leasehold; p. for possession; e.r. for estimated rental; w.r. for weekly rental; q.r. for quarterly rental; y.r. for yearly rental; u.t. for unexpired term; p.a. for per annum; yrs. for years; la. for lane; st. for street; rd. for road; sq. for square; pl. for place; ter. for terrace; cres. for crescent; av. for avenue; gdns. for gardens; yd. for yard; gr. for grove; b.h. for beer-house; p.h. for public-house; o. for offices; s. for shops; ct. for court.

MEETINGS.

SATURDAY, SEPTEMBER 3.

Association of Municipal and County Engineers.—Midland District Meeting to be held at Birmingham, Tame and Rea District Drainage Board's Works.

OCTOBER 6 and 8.

Visit of the Royal Institute of British Architects to Newcastle-upon-Tyne.—The following, amongst other arrangements, are being made in connexion with the visit of the Institute to Newcastle: The Northern Architectural Association Reception Committee will receive the visiting members of the Institute at the County Hotel, at 8.0 p.m., on October 6th. His Worship the Mayor of Newcastle will receive the members at 10.0 a.m., on October 7th. After which, about an hour will be devoted to the reading and discussion of a paper on "Specialism in Architecture." The President of the R.I.B.A. will take the Chair. The Cathedral and the Trinity House will be visited. The Northern Architectural Association will entertain the visiting members at luncheon at the County Hotel, Neville-street, at 1.0 p.m. Arrangements will be made for those members who wish to do so, to visit during the afternoon of Friday, places of interest in the immediate neighbourhood. In the evening a dinner will be held, and on Saturday, October 8th, arrangements will be made for those who desire to do so, to visit Hexham Abbey and the Roman Station at the Chesters, Chollerford, etc.; also the New Shipbuilding Sheds at Messrs. Swan & Hunter's, Wallsend.

TO CORRESPONDENTS.

E. B. (Below our limit).—A. G. (Amounts should have been stated).

NOTE.—The responsibility of signed articles, letters, and papers read at meetings rests, of course, with the authors.

We cannot undertake to return rejected communications; and the Editor cannot be responsible for drawings, manuscripts, or other documents sent to or left at this office, unless he has specially asked for them.

Letters or communications (beyond mere news items) which have been duplicated for other journals are NOT DESIRED.

All communications must be authenticated by the name and address of the sender, whether for publication or not. No notice can be taken of anonymous communications.

We are compelled to decline pointing out books and giving addresses.

Any commission to a contributor to write an article, or to execute or lend a drawing for publication, is given subject to the approval of the article or drawing, when received, by the Editor, who retains the right to reject it if unsatisfactory. The receipt by the author of a proof of an article in type does not necessarily imply its acceptance.

All communications regarding literary and artistic matters should be addressed to THE EDITOR; those relating to advertisements and other exclusively business matters should be addressed to THE PUBLISHER, and not to the Editor.

PRICES CURRENT OF MATERIALS.

** Our aim in this list is to give, as far as possible, the average prices of materials, not necessarily the lowest. Quality and quantity obviously affect prices—a fact which should be remembered by those who make use of this information.

BRICKS, &c.

	£ s. d.	
Hard Stocks	1 16 0	per 1000 alongside, in river.
Rough Stocks and Grizzles	1 13 0	
Facing Stocks	2 12 0	" " "
Flippers	2 10 0	" " "
		" " "

BRICKS, &c.—(*continued*).

	£ s. d.		
Flettons	1 10 0	per 1000	at railway depôt.
Red Wire Cuts	1 13 0	"	" "
Best Fareham Red	3 12 0	"	" "
Best Red Pressed Ruabon Facing	5 0 0	"	" "
Best Blue Pressed Staffordshire	4 4 0	"	" "
Do. Bullnose	4 10 0	"	" "
Best Stourbridge Fire Bricks	4 8 0	"	" "
GLAZED BRICKS.			
Best White and Ivory Glazed Stretchers	13 0 0	"	" "
Headers	12 0 0	"	" "
Quoins, Bullnose, and Flats	17 0 0	"	" "
Double Stretchers	19 0 0	"	" "
Double Headers	16 0 0	"	" "
One Side and two Ends	19 0 0	"	" "
Two Sides and one End	20 0 0	"	" "
Splays, Chamferred, Squints	20 0 0	"	" "
Best Dipped Salt Glazed Stretchers, and Header	12 0 0	"	" "
Quoins, Bullnose, and Flats	14 0 0	"	" "
Double Stretchers	15 0 0	"	" "
Double Headers	14 0 0	"	" "
One Side and two Ends	15 0 0	"	" "
Two Sides and one End	15 0 0	"	" "
Splays, Chamferred, Squints	14 0 0	"	" "
Second Quality White and Dipped Salt Glazed	2 0 0	"	less than best.

	s. d.		
Thames and Pit Sand	7 3	per yard,	delivered.
Thames Ballast	6 0	"	"
Best Portland Cement	30 0	per ton,	"
Best Ground Blue Lias Lime	21 0	"	"

NOTE.—The cement or lime is exclusive of the ordinary charge for sacks.

Grey Stone Lime.....12s. 0d. per yard, delivered.
Stourbridge Fireclay in sacks 27s. 6d. per ton at rly. dpt.

STONE.

	s. d.		
BATH STONE—delivered on road waggons, Paddington Depôt	1 6½	per ft. cube.	
Do. do. delivered on road waggons, Nine Elms Depôt	1 8¼	"	"
PORTLAND STONE (20 ft. average)—Brown Whitbed, delivered on road waggons, Paddington depôt, Nine Elms depôt, or Pimlico Wharf	2 1	"	"
White Basebed, delivered on road waggons, Paddington depôt, Nine Elms depôt, or Pimlico Wharf	2 2½	"	"

	s. d.		
Ancaster in blocks	1 11	per ft. cube,	deld. rly. depôt.
Beer "	1 6	"	"
Greenshill "	1 10	"	"
Darley Dale in blocks	2 4	"	"
Red Corsehill "	2 5	"	"
Closeburn Red Freestone	2 0	"	"
Red Mansfield "	2 4	"	"

YORK STONE—*Robin Hood Quality.*

Scappled random blocks	2 10	,	"
6 in. sawn two sides landings to sizes (under 40 ft. super.)	2 3	per ft. super.	"
6 in. rubbed two sides ditto, ditto	2 6	"	"
3 in. sawn two sides slabs (random sizes)	0 11½	"	"
2 in. to 2½ in. sawn one side slabs (random sizes)	0 7½	"	"
1½ in. to 2 in. ditto, ditto	0 6	"	"

HARD YORK—

Scappled random blocks	3 0	per ft. cube,	"
6 in. sawn two sides, landings to sizes (under 40 ft. super.)	2 8	per ft. super.	"
6 in. rubbed two sides ditto	3 0	"	"
3 in. sawn two sides (slabs random sizes)	1 2	"	"
2 in. self-faced random flags	0 5	"	"
Hopton Wood (Hard Bed)	in blocks 2 3	per ft. cube. deld. rly. depôt.	
" " "	6 in. sawn both sides landings	2 7	per ft. super. deld. rly. depôt.
" " "	3 in. do.	1 2½	" "

SLATES.

in. in.	£ s. d.		
20 × 10 best blue Bangor	13 2 6	per 1000 of 1200 at r. d.	
20 × 12 " "	13 17 6	"	"
20 × 10 first quality "	13 0 0	"	"
20 × 12 " " "	13 15 0	"	"
16 × 8 " " "	7 5 0	"	"
20 × 10 best blue Portmadoc	12 12 6	"	"
16 × 8 " "	6 12 6	"	"
20 × 10 best Eureka unfading green	15 17 6	"	"
20 × 12 " "	18 7 6	"	"
18 × 10 " "	13 5 0	"	"
16 × 8 " "	10 5 0	"	"
20 × 10 permanent green	11 12 6	"	"
18 × 10 " "	9 12 6	"	"
16 × 8 " "	6 12 6	"	"

TILES.

	s. d.		
Best plain red roofing tiles	42 0	per 1000	at rly. depôt.
Hip and Valley tiles	3 7	per doz.	" "
Best Broseley tiles	50 0	per 1000	" "
Do. Ornamental tiles	52 6	"	" "
Hip and Valley tiles	4 0	per doz.	" "
Best Ruabon red, brown, or brindled do. (Edwards)	57 6	per 1000	" "
Do. Ornamental do	60 0	"	" "
Hip tiles	4 0	per doz.	" "
Valley tiles	3 0	"	" "
Best Red or Mottled Stafford shire do. (Peakes)	51 9	per 1000	" "
Do. Ornamental do	54 6	"	" "
Hip tiles	4 1	per doz.	" "
Valley tiles	3 8	"	" "
Best "Rosemary" brand plain tiles	48 0	per 1000	" "
Best Ornamental tiles	50 0	"	" "
Hip tiles	4 0	per doz.	" "
Valley tiles	3 8	"	" "
Best "Hartshill" brand plain tiles, sand faced.	50 0	per 1000	" "
Do. pressed	47 6	"	" "
Do. Ornamental do	50 0	"	" "
Hip tiles	4 0	per doz.	" "
Valley tiles	3 6	"	" "

WOOD.

	At per standard. £ s. d.	At per standard. £ s. d.	
Deals: best 3 in. by 11 in. and 4 in. by 9 in. and 11 in	15 10 0	16 10 0	
Deals: best 3 by 4	14 10 0	15 10 0	
Battens: best 2½ in. by 7 in. and 8 in., and 3 in. by 7 in. and 8 in.	11 10 0	12 10 0	
Battens: best 2½ by 6 and 3 by 6	0 10 0	less than 7 in. and 8 in.	
Deals: seconds	1 0 0	less than best	
Battens: seconds	0 10 0	" "	
2 in. by 4 in. and 2 in. by 6 in.	9 0 0	9 10 0	
2 in. by 4½ in. and 2 in. by 5 in.	8 10 0	9 10 0	
Foreign Sawn Boards—1 in. and 1¼ in. by 7 in.	0 10 0	more than battens.	
¾ in.	1 0 0	"	

	At per load of 50 ft.		
Fir timber: best middling Danzig or Memel (average specification)	4 10 0	5 0 0	
Seconds	4 5 0	4 10 0	
Small timber (8 in. to 10 in.)	3 12 6	3 15 0	
Small timber (6 in. to 8 in.)	3 0 0	3 10 0	
Swedish balks	2 15 0	3 0 0	
Pitch-pine timber (30 ft. average)	3 5 0	3 15 0	

JOINERS' WOOD.	At per standard.		
White Sea: first yellow deals, 3 in. by 11 in	23 0 0	24 0 0	
3 in. by 9 in.	21 0 0	22 10 0	
Battens, 2½ in. and 3 in. by 7 in.	17 0 0	18 10 0	
Second yellow deals, 3 in. by 11 in.	18 10 0	20 0 0	
" " 3 in. by 9 in.	17 10 0	19 0 0	
Battens, 2½ in. and 3 in. by 7 in.	13 10 0	14 10 0	
Third yellow deals, 3 in. by 11 in. and 9 in.	15 10 0	16 10 0	
Battens, 2½ in. and 3 in. by 7 in.	11 10 0	12 10 0	
Petersburg: first yellow deals, 3 in. by 11 in.	21 0 0	22 10 0	
Do. 3 in. by 9 in.	18 0 0	19 10 0	
Battens	13 10 0	15 0 0	
Second yellow deals, 3 in. by 11 in.	16 0 0	17 0 0	
Do. 3 in. by 9 in.	14 10 0	16 0 0	
Battens	11 0 0	12 10 0	
Third yellow deals, 3 in. by 11 in.	13 10 0	14 0 0	
Do. 3 in. by 9 in.	13 0 0	14 0 0	
Battens	10 0 0	11 0 0	
White Sea and Petersburg:— First white deals, 3 in. by 11 in.	14 10 0	15 10 0	
" " 3 in. by 9 in.	13 10 0	14 10 0	
Battens	11 0 0	12 0 0	
Second white deals, 3 in. by 11 in.	13 10 0	14 10 0	
" " 3 in. by 9 in.	12 10 0	13 10 0	
" " battens	9 10 0	10 10 0	
Pitch-pine: deals	16 10 0	20 0 0	
Under 2 in. thick extra	0 10 0	1 0 0	
Yellow Pine—First, regular sizes	40 0 0	upwards.	
Oddments	28 0 0	"	
Seconds, regular sizes	30 0 0	"	
Yellow Pine oddments	25 0 0	"	
Kauri Pine—Planks, per ft. cube	0 3 6	0 5 0	
Danzig and Stettin Oak Logs—Large, per ft. cube	0 2 6	0 3 6	
Small " "	0 2 3	0 2 6	
Wainscot Oak Logs, per ft. cube.	0 5 0	0 5 6	
Dry Wainscot Oak, per ft. sup. as inch	0 0 8	0 0 9	
¾ in. do. do.	0 0 7	—	
Dry Mahogany—Honduras, Tabasco, per ft. super. as inch	0 0 9	0 1 0	
Selected, Figury, per ft. sup. as inch	0 1 6	0 2 6	
Dry Walnut, American, per ft. sup. as inch	0 0 10	0 1 0	
Teak, per load	17 0 0	21 0 0	
American Whitewood Planks, per ft. cube	0 4 0	—	

Prepared Flooring—	Per square.	
1 in. by 7 in. yellow, planed and shot	0 13 6	0 17 6
1 in. by 7 in. yellow, planed and matched	0 14 0	0 18 0
1¼ in. by 7 in. yellow, planed and matched	0 16 0	1 0 0
1 in. by 7 in. white, planed and shot	0 12 0	0 14 6
1 in. by 7 in. white, planed and matched	0 12 6	0 15 0
1¼ in. by 7 in. white, planed and matched	0 15 0	0 16 6
¾ in. by 7 in. yellow, matched and beaded or V-jointed brds.	0 11 0	0 13 6
1 in. by 7 in. do. do.	0 14 0	0 18 0
¾ in. by 7 in. white do. do.	0 10 0	0 11 6
1 in. by 7 in. do. do. do.	0 11 6	0 13 6

6 in. at 6d. to 9d. per square less than 7 in.

PRICES CURRENT.—*Continued on page 239.*

COMPETITIONS AND CONTRACTS.

(For some Contracts, &c., still open, but not included in this List, see previous issues.)

CONTRACTS.

Nature of Work or Materials.	By whom Advertised.	Forms of Tenders, etc., supplied by	Tenders to be Delivered
Windows and Minor Alterations, Eye Workhouse ..	Hartismere Guardians	H. Warnes, Clerk, Castle-street, Eye	Aug. 27
Farmer's Arms Hotel, Hafod	.....	A. O. Evans, Architect, Pontypridd	do.
Stabling, Trade-lane, Cardiff	Messrs. Sessions & Sons, Ltd, ...	E. G. C. Down, Architect and Surveyor, 31, High-street, Cardiff	do.
Alterations to House at Heworth	Felling Education Committee	H. Miller, Architect, Council Buildings, Felling	Aug. 29
Repair of Queen-street, West Vale	Greetland U.D.C.	R. Horsfall & Son, Surveyors, 22A, Commercial-street, Halifax ..	do.
Curb, Setts, and Flags for Queen-street	do.	do.	do.
Painting Fire Brigade Station, Gibbet-street	Halifax Corporation	J. Lord, C.E., Borough Engineer, Town Hall, Halifax	do.
Sludge Tanks and Press House, Sewage Disposal Wks.	do.	do.	do.
Widening Radstone-lane	Brackley R.D.C.	W. J. Treadwell, District Surveyor, Middleton Cheney, Banbury	do.
220 yds. of Cast-Iron Sewerage Main	Worksop U.D.C.	F. S. Whittell, Surveyor, Town Hall, Worksop	do.
House, Llantarnam	Executors of late H. Lawrence	J. H. Rennie & Co., Architects, Skinner-street, Newport	do.
Byre at Monimuies	.....	J. Wittet, Architect, Elgin	do.
Superstructure of Bridge, Hamilton	Caledonian Railway Co.	Engineer, Buchanan-street Station, Glasgow	do.
Footbridge	do.	do.	do.
Private Improvement Works	Bootle Corporation	Borough Engineer, Town Hall, Bootle	Aug. 30
Bolts, Nuts, and Rivets	Southern Mahratta Railway Co.	E. Z. Thornton, Secretary, 46, Queen Anne's-gate, S.W.	do.
Bridge Building, Round Thorn, Baguley	Bucklow R.D.C.	G. Leigh, Clerk, Union Offices, Knutsford	do.
Road Improvements, Lavernock	Llandaff and Dinas Powis R.D.C...	J. Holden, Surveyor, Llandaff-chambers, 35, St. Mary-st., Cardiff	do.
Road Metalling, Michaelstone-super-Ely	do.	do.	do.
Hauling Clee Hill Stone	do.	do.	do.
110 Tons of Steel Flat-bottomed Rails	Leeds Corporation	City Engineer's Office, Leeds	do.
Thirty Standards Railing Sleepers for 2-ft. Gauge ..	do.	do.	do.
Twenty-five Standards Pitch Pine for Bridges, etc.	do.	do.	do.
Road Improvements, Pendoylan	Llandaff and Dinas Powis R.D.C...	J. Holden, Surveyor, Llandaff-chambers, 35, St. Mary-st., Cardiff	do.
Road Improvements, Peterstone	do.	do.	do.
Road Improvements, Wenvoe	do.	do.	do.
Painting Sanatorium Buildings, etc., Seacroft	Leeds Sanitary Committee	Clerk of Works, Seacroft Hospital, Leeds	do.
Plumbing Materials, Corporation Waterwks., Masham	Leeds Corporation	City Engineer's Office, Leeds	do.
Sunday Schools, etc., Frindsbury	.....	E. F. Cobb, Architect, 20, High-street, Rochester	do.
New Wing & Alterations at Farm Buildings, Torehead	.....	J. Wittet, Architect, Elgin	do.
Steel Rails and Fish Plates	East India Railway Co.	C. W. Young, Secretary, Nicholas-lane, E.C.	Aug. 31
Electric Light Sub-Station, Adelaide-st., The Docks	Cardiff Corporation	W. Harpur, Borough Engineer, Town Hall, Cardiff	do.
Bridge, etc., Trout-lane, Yiewsley	Uxbridge R.D.C.	E. Birks, Engineer, Town Hall, Uxbridge	do.
1,000 Tons Broken Granite Road Metalling	Kenilworth U.D.C.	S. Douglas, Engineer, Council House, Kenilworth	do.
Reslating Kilsyth Manse	Heritors of Kilsyth	R. J. Graham, Royal Bank Buildings, Kilsyth	do.
Enlargement, etc., of Llandyri Church	.....	W. Griffiths, Architect, Llanelly	do.
Caretaker's House adjoining Club, Merthyr Vale....	.....	W. Dowdeswell, Architect, Treharris	do.
Iron Railings, Guide Bridge Station	Audenshaw U.D.C.	W. Clough, Engineer, 2, Guide-lane, Audenshaw	do.
Library, Lichfield-street, Walsall	Walsall Corporation	J. S. Gibson, Architect, 5, Old Bond-street, London, W.	do.
Electric Light Installation, Albion-road School	Edinburgh School Board	Crawford & Cumming, Engineers, 122, George-street, Edinburgh	do.
Sunday Schools, etc., Horden P.M. Church	.....	J. Walton Taylor, St. John-st., Grainger-st.-west, N'castle-on-Tyne	Sept. 1
Sinking a Pit at Tarbrax	.....	Manager, Tarbrax Works, Cobbinshaw	do.
Scavenging Contract	Blaydon U.D.C.	R. Biggins, Sanitary Inspector, Council Offices, Blaydon	do.
Paving Streets	Gateshead Corporation	N. P. Pattinson, Borough Surveyor, Town Hall, Gateshead	do.
Distiller's House, Dalwhinnie Distillery	.....	A. Mackenzie, C.E., County-buildings, Kingussie	do.
Warehouse, Dalwhinnie Distillery	.....	do.	do.
Malting Barns, Dalwhinnie Distillery	.....	do.	do.
Pipes for Supply Cistern, etc.	.....	do.	do.
General Repairs	.....	do.	do.
Sanitary Annexe at Workhouse, Penistone	Guardians	G. A. Wilde, Architect, 9, Bank-street, Sheffield	do.
1,000 yds. of Asphalte Footpath	Wallsend Corporation	G. Hollings, Borough Surveyor, Wallsend	Sept. 2
Sixteen Houses, Rowe's-square, Rhymney	Victoria Building Club	W. H. Trump, Solicitor, Rhymney, Mon.	do.
Completing Thirteen Houses, Rowe's-sq., Rhymney	do.	do.	do.
Greenhouse, Strood Cemetery	Joint Burial Committee	A. B. Acworth, Architect, 114, High-street, Strood	do.
Builder's Work at Gasworks, Down District Lun. Asy.	Committee of Management	Resident Medical Superintendent, Downpatrick	do.
Laying Sanitary Pipes, Byker	St. Anthony's Estate	A. S. Dinning, 21, Ellison-place, Newcastle-on-Tyne	Sept. 3
600 Tons of X Broken Granite	Stamford Town Council	F. R. Ryman, Borough Surveyor, 8, St. Mary's-street, Stamford	do.
400 Tons of XX Broken Granite	do.	do.	do.
Street Works	Hoole U.D.C.	H. Davies, Building Surveyor, 14, Newgate-street, Chester	do.
Iron Bridge at Tutt's Bridge, West Wellow	Romsey R.D.C.	J. Allsop, Clerk, The Abbey, Romsey	do.
Cottages	Londonderry R.D.C.	M. A. Robinson, Engineer, Richmond-street, Londonderry	Sept. 5
56 Houses & Two Shops, Cwmneol Est., Cwmaman	Aberneol Building Co.	J. Llewellin Smith & Davies, Architects, Aberdare	do.
Stoneware Pipes, etc. (Carleton Sewerage)	Thornton, etc., Joint Sewage Com.	A. Hindle, A.M.Inst.C.E., 44, Abingdon-street, Blackpool	do.
Main Sewers, etc., Carleton (Contract 13)	do.	do.	do.
Painting at Workhouse, Gravelly Hill	Aston Guardians	J. North, Clerk, Union Offices, Vauxhall-road, Birmingham	do.
Broken Mountain Limestone and Gravel	Mountain Ash U.D.C.	W. G. Thomas, Surveyor, Public Offices, Mountain Ash	do.
Native Stone	do.	do.	do.
Hauling Stone, etc.	do.	do.	do.
500 yds. of Asphalting, Midland-road	Royston U.D.C.	J. Raley, Clerk to Council, Barnsley	do.
Foundations for Pumping Machinery, Mildmay-road	Chelmsford Corporation	P. Griffith, Engineer, 54, Parliament-street, Westminster, S.W.	do.
Making Milestone-lane	Handsworth U.D.C.	H. Richardson, Engr., Council House, Handsworth, Birmingham	do.
600 lineal yds. of Granite Kerb	Stamford Corporation	F. R. Ryman, Borough Surveyor, 8, St. Mary's-street, Stamford	do.
650 yds. of Concrete Flag Paving	do.	do.	do.
Redrainage, etc., Page Green Schools, Broad-lane ..	Tottenham Education Committee..	W. H. Prescott, Surv., Coombes Croft Hse., 712, High-rd., T'ham	do.
190 yds. of Fencing and Gates, Cathays Park	Cardiff Corporation	W. Harpur, Borough Engineer, Town Hall, Cardiff	do.
Taking Down and Re-erecting 280 yds. of Fencing	do.	do.	Sept. 6
Heating Wards, Sick Asylum, Devons-road, Bromley	Poplar and Stepney Asyl. Managers	J. & W. Clarkson, Architects, 136, High-street, Poplar, E.	do.
500-ton Sand Pump Hopper Steam Dredger	Wexford Harbour Commissioners ..	Flannery & Given, Engineers, 17, Water-street, Liverpool	do.
Road Material	Woking U.D.C.	G. J. Wooldridge, Surveyor, Bank Chambers, Woking	do.
Machinery for Self-Acting Incline Railway	Crookston Bros., Glasgow	Sheffield & Twinberrow, Engrs., 15, New B'dge-st., Newcastle-on-Tyne	do.
Cemetery Fencing at Lemington	Newburn U.D.C.	T. Gregory, Newburn-on-Tyne	do.
*Erection of Workmen's Dwellings	Barking Town U.D.C.	C. J. Dawson, Architect, East-street, Barking	Sept. 7
Buildings for Boys and Girls, Lichfield-street, Walsall	Governors of Queen Mary Schools..	Bailey & McConnal, Architects, Bridge-street, Walsall	do.
Loop Line, Berkeley-road, Gloucestershire	G.W. Railway	Engineer, Paddington Station	do.
Additions, etc., Auxiliary Bldgs., Pellets-Town, Cabra	S. Dublin Guardians	J. P. Condon, Clerk, Boardroom, James-street, Dublin	do.
Sinking Wells, Crumlin, Co. Dublin	S. Dublin R.D.C.	T. J. Byrne, 1, James'-street, Dublin	do.
Tools, Portland Cement, etc.	Rochester Corporation	W. Banks, City Surveyor, Guildhall, Rochester	Sept. 8
Street Paving and Repairs	Newport (Salop) U.D.C.	A. Massey, Surveyor, Newport, Salop	do.
Materials	Gosport, etc., U.D.C.	H. Frost, Surveyor, Council Offices, Gosport	Sept. 9
*New Coastguard Buildings at Hove	Admiralty	Superintending Engineer, H.M. Dockyard, Portsmouth	do.
*New Coastguard Buildings at Barrow-in-Furness ..	do.	Director of Works Dept., Admiralty, 21, Northumberland-ave., W.C.	do.
*New Coastguard Buildings at Fifeness	do.	Supt. Engr., H.M. Naval Estb., Rosyth, near Inverkeithing, N.B.	Sept. 10
1,000 sq. yds. of Filtration Material at Sewage Works	Radcliffe U.D.C.	W. L. Rothwell, Engineer, Council Offices, Radcliffe	do.
Footbridge over Canal at Scotson Fold	do.	do.	do.
Outside Painting, Stanwix Cemetery	Stanwix Burial Board	The Curator	Sept. 12
Roadworks, Buckhurst-lane	Sevenoaks U.D.C.	S. Towlson, Surveyor, Council Offices, Sevenoaks	do.
*Erection of Chimney Shaft	Torquay Town Council	Borough Engineer, Town Hall-chambers, Torquay	Sept. 13
Council Buildings, High-street, Epping	U.D.C.	G. J. Creed, Clerk, Epping	do.
Electric Pump, Mains, etc.	Enniscorthy District Lunatic Asy.	H. T. Harris, C.E., 30, Parliament-street, Dublin	do.
*Supply of Portland Cement	Edmonton U.D.C.	G. Eedes Eachus, Engineer, Town Hall, Edmonton	do.
Sewerage and Surface-water Drains	do.	do.	do.
Dust Collection	do.	R. J. Butland, Town Hall, Edmonton	do.
*Supply of Broken Granite	do.	Council's Engineer, Town Hall, Edmonton	do.
*Supply of Stoneware Pipes	do.	do.	Sept. 17
Railway Siding, Cape Hill, Smethwick	.....	James & Leith Lea & Sons, Surveyors, 19, Cannon-st., Birmingham	Sept. 19
Widening Treseuny Bridge, Grosmont	Abergavenny R.D.C.	J. Gill, Surveyor, 4, Brewn-road, Abergavenny	

CONTRACTS.—*Continued.*

Nature of Work or Materials.	By whom Advertised.	Forms of Tender, etc., supplied by	Tenders to be delivered
*Erection of Council Buildings	Epping U.D.C.	Clerk's Office, Epping	Sept. 13
*Road Making and Sewer Works	Hornsey Town Council	Borough Engineer, Southwood-lane, Highgate, N.	Sept. 21
Condenser, Water Pipes, Supports, etc.	The L.C.C.	County Hall, Spring-gardens, S.W.	Oct. 4
Pull'g Down Fourteen Houses, Barker-st., Shrewsbury	.....	W. Richards, Surveyor, Swan-hill, Shrewsbury	No date.
Cleaning-out Watercourses, Burnham, Datchet, etc.	Eton R.D.C.	A. Gladwell, District Surveyor, 160, High-street, Slough	do.
Hospital at Denaby Main	.....	H. L. Smethurst, Architect, Conisborough, near Rotherham	do.
Restoration Works, Church of Burnham Ulph, Norfolk	.....	A. J. Lacey, Architect, 6, Upper King-street, Norwich	do.
Fireproof Buildings at Crumlin-road Factory, Belfast	.....	9, Bedford-street, Belfast	do.
Library and House, Granby and Packe-streets	Loughborough Town Council	Barrowcliff & Allcock, Archs., Town Hall-chambers, Loughborough	do.
Factory, Hardcastle-street, Belfast	Thomas Somerset & Co.	S. C. Hunter, 2, Wellington-place, Belfast	do.
*Erection of Public Library	Walsall Corporation	J. S. Gibson, Architect, 5, Old Bond-street, W.	do.

COMPETITION.

Nature of Work.	By whom Required.	Premiums.	Designs to be Delivered
*New Public Offices	Wallasey U.D.C.	250*l.*, 75*l.*, and 50*l.*	Oct. 31

Those marked with an asterisk (*) are advertised in this Number. *Competitions*, iv. *Contracts*, iv. vi. viii. x. *Public Appointments*, xvii.

PRICES CURRENT.—*Continued from page 237.*

JOISTS, GIRDERS, &c.

	In London, or delivered Railway Vans, per ton.		
	£ s. d.		£ s. d.
Rolled Steel Joists, ordinary sections	6 5 0	...	7 5 0
Compound Girders, ordinary sections	8 2 6	...	9 5 0
Angles, Tees and Channels, ordinary sections	7 17 6	...	8 17 0
Fitch Plates	8 5 0	...	8 15 0
Cast Iron Columns and Stanchions including ordinary patterns	7 2 6	...	8 5 0

METALS.

	Per ton, in London.		
Iron—	£ s. d.		£ s. d.
Common Bars	7 5 0	...	7 15 0
Staffordshire Crown Bars, good merchant quality	7 15 0	...	8 5 0
Staffordshire "Marked Bars"	10 0 0	...	—
Mild Steel Bars	8 15 0	...	9 5 0
Hoop Iron, basis price	9 5 0	...	9 10 0
" " Galvanized	17 10 0	...	—
("And upwards, according to size and gauge.)			
Sheet Iron, Black—			
Ordinary sizes to 20 g.	9 15 0	...	—
" " 24 g.	10 15 0	...	—
" " 26 g.	12 5 0	...	—
Sheet Iron, Galvanised, flat, ordinary quality—			
Ordinary sizes—6 ft. by 2 ft. to 3 ft. to 20 g.	12 15 0	...	—
Ordinary sizes to 22 g. and 24 g.	13 5 0	...	—
" " 26 g.	14 5 0	...	—
Sheet Iron, Galvanised, flat, best quality—			
Ordinary sizes to 20 g.	16 0 0	...	—
" " 22 g. and 24 g.	16 10 0	...	—
" " 26 g.	18 0 0	...	—
Galvanised Corrugated Sheets—			
Ordinary sizes 6 ft. to 8 ft. 20 g.	12 10 0	...	—
" " 22 g. and 24 g.	13 0 0	...	—
" " 26 g.	13 15 0	...	—
Best Soft Steel Sheets, 6 ft. by 2 ft. to 3 ft. by 20 g. and thicker	11 15 0	...	—
Best Soft Steel Sheets, 22 g. & 24 g.	12 15 0	...	—
" " 20 g.	14 0 0	...	—
Cut nails, 3 in. to 6 in.	9 0 0	...	9 10 0
(Under 3 in., usual trade extras.)			

LEAD, &c.

	Per ton, in London.		
	£ s. d.		£ s. d.
Lead—Sheet, English, 3lb. and up	14 10 0	...	—
Pipe in coils	15 0 0	...	—
Soil pipe	17 10 0	...	—
Compo pipe	17 10 0	...	—
Zinc—Sheet—			
Vieille Montagne ....ton	27 0 0	...	—
Silesian	26 15 0	...	—
Copper—			
Strong Sheet....per lb.	0 0 10	...	—
Thin " .... "	0 0 11	...	—
Copper nails .... "	0 0 10	...	—
Brass—			
Strong Sheet .... "	0 0 9½	...	—
Thin " .... "	0 0 10	...	—
Tin—English Ingots .... "	0 1 3½	...	—
Solder—Plumbers' .... "	0 0 6½	...	—
Tinmen's .... "	0 0 8	...	—
Blowpipe .... "	0 0 9	...	—

ENGLISH SHEET GLASS IN CRATES.

15 oz. thirds	2½d. per ft. delivered.
" fourths	1¾d. " "
21 oz. thirds	3¼d. " "
" fourths	2¼d. " "
26 oz. thirds	4d. " "
" fourths	3¼d. " "
32 oz. thirds	5d. " "
" fourths	4¼d. " "
Fluted Sheet, 15 oz.	3d. " "
" 21 oz.	4d. " "
½ Harley's Rolled Plate	1¾d. " "
¾ " " "	1¾d. " "
1 " " "	2¼d. " "

OILS, &c.

		£ s. d.
Raw Linseed Oil in pipes	per gallon	0 1 7
" " " in barrels	"	0 1 8
" " " in drums	"	0 1 10
Boiled " " in pipes	"	0 1 9
" " " in barrels	"	0 1 10
" " " in drums	"	0 2 0
Turpentine, in barrels	"	0 3 6
" in drums	"	0 3 8
Genuine Ground English White Lead	per ton	18 15 0
Red Lead, Dry	"	18 10 0
Best Linseed Oil Putty	per cwt.	0 6 6
Stockholm Tar	per barrel	1 12 0

VARNISHES, &c.

	Per gallon. £ s. d.
Fine Pale Oak Varnish	0 8 0
Pale Copal Oak	0 10 6
Superfine Pale Elastic Oak	0 12 6
Fine Extra Hard Church Oak	0 10 0
Superfine Hard-drying Oak, for seats of Churches	0 14 0
Fine Elastic Carriage	0 12 6
Superfine Pale Elastic Carriage	0 16 0
Fine Pale Maple	0 16 0
Finest Pale Durable Copal	0 18 0
Extra Pale French Oil	1 1 0
Eggshell Flatting Varnish	0 18 0
White Copal Enamel	1 4 0
Extra Pale Paper	0 12 0
Best Japan Gold Size	0 10 6
Best Black Japan	0 16 0
Oak and Mahogany Stain	0 9 0
Brunswick Black	0 8 6
Berlin Black	0 16 0
Knotting	0 10 0
French and Brush Polish	0 10 0

TENDERS.

Communications for insertion under this heading should be addressed to "The Editor," and must reach us *not later than* 10 *a.m. on Thursdays.* [N.B.—We cannot publish Tenders unless authenticated either by the architect or the building-owner; and we cannot publish announcements of Tenders accepted unless the amount of the Tender is stated, nor any list in which the lowest Tender is under 100*l.*, unless in some exceptional cases and for special reasons.]

*** Denotes *accepted.* † Denotes *provisionally accepted.***

ABINGDON.—*For* constructing about 318 yds. of stoneware pipe sewers, for the Corporation. Mr. G. Winship, C.E., Abingdon:—

H. Roberts	£730 10	J. Ricketts	£446 10
G. R. Mann	660 0	W. H. Randall, Abingdon*	415 0
T. Williams	457 13		

CHELTENHAM.—For the enlargement of the head post-office, for the Commissioners of H.M. Works and Public Buildings:—

		Credit old materials.
E. Saunders & Sons	£6,222 0 0	£67 13 0
F. J. Williams	5,807 9 1½	105 18 10
A. J. Beaven	5,867 0 0	—
Bromage & Evans	5,600 0 0	—
Stephens, Bastow, & Co., Ltd.	5,588 0 0	—
A. Estcourt & Sons	5,555 0 0	—
A. C. Billings & Sons, Ltd.	5,287 0 0	91 0 0
Collins & Godfrey	5,110 0 0	85 0 0
J. Byard & Sons	4,986 0 0	—
E. Walters & Son	4,817 0 0	—
M. Warren	4,674 0 1½	60 0 0
A. J. Colborne*	4,376 0 0	34 10 0

CLONMEL.—For erecting three new blocks of buildings at Clonmel District Lunatic Asylum. Mr. J. F. Fuller, architect, 179, Great Brunswick-street, Dublin:—

M. Barry	£23,433	J. & P. Good	£16,900
Jones	18,901	J. M. Stuart	16,750
Sheridan	17,959	W. Beckell	16,350
Corry & Co.	17,300	Collen Bros.	16,000
Crampton	17,270	Ryan & Son	15,892
McLoughlin & Harvey	17,195	Nolan	15,582
J. Beckett	17,000	I. P. Pile	15,450
Laverty & Sons	17,000	Hill, Cork*	14,989

COLCHESTER.—For erecting a board-room, muniment-room, pay-offices, etc., at the Workhouse, for the Guardians. Mr. G. H. Page, architect and surveyor, Trinity-chambers, Colchester. Quantities by the architect:—

Oak Building Co.	£2,495	G. Grimwood & Sons	£2,189
T. J. Ward	2,490	E. West	2,047
G. Dobson & Son	2,385	R. Beaumont, Colchester‡	1,996
H. W. Gladwell, jun.	2,374		
H. Chambers	2,195		

‡ Accepted subject to the approval of the Local Government Board.

GILBERDIKE.—For alterations and additions to the Council School, for the Education Committee of the East Riding of Yorkshire. Mr. Bernard B. Stamford, clerk of works, County Hall, Beverley:—

T. S. Ullathorne	£410 0 0	Thompson & Co.	£339 10 0
J. Thompson & Son	380 0 0	J. Davy, Gilberdike*	330 0 6
J. Hudson	353 5 3		

HEREFORDSHIRE.—For alterations to Pontrilas Court, Herefordshire, for Colonel Lucas Scudamore. Messrs. Groome & Bettington, architects and surveyors, Hereford:—

J. Fleming & Co.	£1,319 17 6	W. P. Lewis & Co.	£909 0 0
Bolt, Davies, & Co.	1,000 0 0	Beavan & Hodges, Hereford*	865 13 6
W. Powell	937 5 0		

Painting and Decorating.

J. C. M. Vaughan, Hereford*

LEYTON.—For renovating work at Grange Park Congregational Church, for the Building Committee. Mr. J. Williams Dunford, architect, 100c, Queen Victoria-street, E.C.:—

G. M. Page	£473	J. Penn	£395
F. J. Coxhead	419	A. E. Clark, Leyton*	348

LONDON.—For alterations and additions to St. Mark's Council Schools, Hanwell, W., for the Middlesex County Council Education Committee. Mr. William Pywell, architect, Cumberland House, Hanwell, W.:—

Godson & Sons	£4,989 0	W. Dickens	£3,969 0
Goddard & Sons	4,450 0	F. G. Minter	3,790 0
Kingerlee & Sons	4,404 0	J. Dorey & Co.	3,694 0
C. F. Kearley	4,263 10	D. Heath	3,694 0
Patman & Fotheringham	4,216 0	A. & B. Hanson*	3,574 0

LONDON.—For the erection of new schools, Oaklands-road, Hanwell, W., for the Middlesex County Council Education Committee. Mr. William Pywell, architect, Cumberland House, Hanwell, W.:—

Patman & Fotheringham	£23,573	G. Godson & Sons	£21,050
Kingerlee & Sons	23,487	A. & B. Hanson	20,940
Goddard & Sons	22,760	J. Dorey & Co.	20,786
C. F. Kearley	22,597	F. G. Minter	20,719
D. Heath	21,224	W. Wisdom	20,450
Amended tenders:—			
J. Dorey & Co.	£18,410	A. & B. Hanson	£18,276
W. Wisdom	18,350	F. G. Minter*	18,250

LONDON.—For rebuilding Nos. 311, 313, 315, Walworth-road, S.E., Mr. Allan Stuart, architect, 91, West Smithfield:—

J. Hunt & Son	£3,245	W. Downs	£3,153
J. Marsland & Son	3,225	R. A. Lowe	3,039
H. Roffey	3,158	G. Parker*	2,8 5

LONDON.—For erecting new vegetable kitchen, extension of male bathroom, and conversion of coal shed into foul linen laundry, at Renfrew-road Workhouse, for the Lambeth Guardians. Messrs. Woodward, Brooks, & Latter, surveyors, 69, Kennington Oval, S.E.:—

		Time for completion.
J. W. Leonard & G. Mason	£1,186 4 0	16 weeks.
J. W. Aldridge	1,185 6 0	12 weeks.
W. Lawrence & Sons	1,094 0 0	14 weeks.
W. J. Coleman & Sons	1,073 0 0	26 weeks.
Cruse & Baldwin	1,045 0 0	10 weeks.
J. J. Richards	1,055 0 0	14 weeks.
H. Kent	998 0 0	10 weeks.
H. Bragg & Sons, 66, Robsart-street, Brixton*	907 0 0	12 weeks.

LONDON.—For external and internal painting, etc., Norwood Schools, for the Lambeth Guardians. Messrs. Woodward, Brooks, & Latter, surveyors:—

		Time for completion.
Spencer, Santo, & Co.	£351 0 0	2 months.
N. Bounrau	328 9 0	1 month.
Hammond & Son	317 5 0	3 months.
J. J. Richards	311 9 6	2 months.
R. Athey	301 10 0	6 weeks.
Buckland Bros.	273 10 0	2 months.
Higgs & Hill	270 0 0‡	5 weeks.
B. Bristow & Son	264 5 0	2 months.
M. McCarthy	263 0 0	2 months.
C. Cooper	261 10 0	2 months.
J. Scott Fenn	261 0 0	1 month.
P. McCarthy	258 13 0	2 months.
Leonard & Mason	257 5 0	—
Loje & Co.	254 0 0	1½ months.
W. Young	251 0 0	2 months.
H. Bragg & Sons	238 4 4	2 months.
Wontner & Co., Ltd.	235 7 0	6 weeks.
E. Mills	222 10 6	2 months.
Langdon & Clark	215 10 6	1 month.
J. Parsons	211 10 0	—
H. Kent, Albion-road, Lewisham*	180 15 0	3 weeks.

‡ Does not include shoring.

LONDON.—For rebuilding the premises Nos. 37, 39, and 41, Leman-street, Whitechapel, E., for Mr. Harris Woolf. Mr. W. A. Longmore, architect, Bridge-chambers, Walthamstow:—

A. Slatter, Walthamstow, N.E.* £3,300

MACCLESFIELD.—For sewage tanks and filters, for the Corporation of Macclesfield. Mr. R. E. W. Berrington, Engineer, Bank-buildings, Wolverhampton. Quantities by Engineer:—

J. Owens, 8, St. Mark's-road, Wolverhampton* .. £9,849

[Twenty tenders received.]

NEWLYN (Penzance).—For baths, stores, Newlyn, Penzance. Mr. H. Maddern, architect and surveyor, 13, Clarence-street, Penzance:—

Whole.

J. S. Tregenza	£760 0	Walters & Burnett	£701 18

Masonry Only.

J. Lavers	£507 0	J. Nicholas, Penzance*	£359 9
C. Tregenza	449 0		
R. Hosking	369 10		

Carpenter and Painter.

J. Rowe	£345 0	W. Grenfell	£281 10
J. Berryman	336 10	J. Hosken, sen.	279 0
J. E. Hosken	325 0	J. Bodinnar	276 0
J. James	320 0	G. Cara, Penzance*	260 0
H. Peake	289 0		

NORTHFLEET (Gravesend).—For painting, etc., the High-street and Lawn-road Schools and cookery kitchen, and the Dover-road School and cottage at Northfleet Council Offices, for the Kent Education Committee:—

B. M. Carpenter	£323 5 0	J. B. Lingham, Northfleet*	£278 17 0
A. Best	306 0 0		

NEW TREDEGAR.—For erecting a new workmen's hall, etc. Messrs. James & Morgan, architects, Charles-street-chambers, Cardiff:—

R. W. Hunter & Co.	£5,902 11 5	D. Davies	£4,410 0 0
E. R. Evans	4,970 0 0	W. D. Davies	4,150 0 0
Cassmore & Perkins	4,950 0 0	W. Watts	4,130 0 0
J. Lewis	4,740 0 0	Williams & Sons	3,990 0 0
G. Griffiths & Son	4,660 0 0	H. Rowlands, New Tredegar*	3,896 10 6
Latty & Co.	4,639 3 7		

STOCKTON-ON-TEES.—For private street improvement works, for the Corporation. Mr. M. H. Sykes, Borough Engineer, Town Hall, Stockton-on-Tees:—

J. G. Spooner, Westbourne-street, Stockton-on-Tees £4,188 12 3

TYNEMOUTH.—For 400 lineal yds. of pipe sewer, etc., at Willington, for the Rural District Council. Mr. A. S. Dinning, surveyor, 21, Ellison-place, Newcastle-on-Tyne:—

J. W. Robson, Newcastle £433 14 0

WELLINGBOROUGH.—For 1,040 tons of granite and 108 tons of granite chippings, for the Urban District Council:—

	Bardon Hill Granite.
Ellis & Werard, Wellingborough	9s. 0d. .. 2½ in.
Ellis & Werard, Wellingborough	7s. 0d. .. ¾ in.

WHITCHURCH (Salop).—For alterations and additions to Union, for the Guardians. Mr. W. Webb, architect, Whitchurch:—

G. Dodd	£315 10 0
J. Corfield, Whitchurch, Salop*	265 0 0

WHITSTABLE.—For new cloak-room for the Albert-street Schools, Whitstable, for the Kent Education Committee. Mr. A. A. Kemp, architect. Quantities by the architect:—

C. Welby	£360 0 0	F. Gann	£290 0 0
G. Reeves	325 0 0	Collar	283 0 0
Goldfinch	321 0 0	Jolly	269 15 0
Camburn	316 0 0	Amos & Foad	244 0 0
Gann & Co.	298 0 0		

WISBOROUGH GREEN (Sussex).—For extension and alteration of the Council School, for the West Sussex County Council. Mr. F. Wheeler, architect, Bank-chambers, Carfax, Horsham:—

I. Waters & Sons, Forest Row, Sussex £1,098

[Lowest of five Tenders.]

WOODFORD (Essex).—For the erection of detached house, Grove-road, Woodford, for Mr. E. J. Walford. Mr. Money Marsland, architect, 68, Great Tower-street, E.C.:—

Parry & Jones	£895	Sheppard Bros.	£710
J. Joliffe	787	W. J. Maddison*	695

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